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EDITORIAL NOTES.

Progress at Leeds University.

WHEN Professor John W. Cobb presented his first annual report as Livesey Professor, it included certain schemes which we regarded as very practical ones, designed as they were to broaden the usefulness of the Department of Coal Gas and Fuel Industries at the Leeds University—particularly to the technical students of the gas industry. That was only a year ago; and we cannot expect big things to mature, when innovations are being dealt with, in the short period of a twelvemonth. But we do feel some amount of regret that Professor Cobb is not in a position, in his second report, to announce a greater reward for his honest attempt at making the department of larger service to the industry. However, things of persistent steady growth are often the most enduring, and, as time progresses, have the most far-reaching influences.

We are not by any means despondent as to the future of the department; on the contrary, we are quite optimistic. On all hands it is admitted that there is a great change coming over the *personnel* of the gas industry, and that in all ranks a higher grade of knowledge is found. There is no reflection in this upon those who have borne the heat and burden of the past day. It is all recognized as necessary under the transmutation of circumstances that has taken place; and the change is an obvious and a welcome fact. This is of good augury for the Coal Gas and Fuel Department of the Leeds University. Higher education means greater recognition of its necessity for others. Another good sign is that last year the number of entries for full-time day students specially attached to the department (though the number is not what we should like it to be) is the highest that has yet been witnessed; and the students, with a good fundamental technical training supplemented by their works' training, cannot fail hereafter to assist in making known the value of the department, and in encouraging the desire in others to make use of the specialized training-ground for those who are destined to take part in the technical work of the gas industry. We have already seen, through the reports made at the meetings of the Institution of Gas Engineers, the fruits of the thorough and excellent scientific training that is to be obtained at the Leeds University; and we must congratulate our gas-stove makers on the measure they promptly and wisely made of the value of the men who have been through, and worked in, the department by securing their services for their works' research laboratories. These men are bringing their influence to bear upon the work to which they have specially set their hands; and the gas industry and its customers are, and will be more so in the future, their beneficiaries. Apart from those students who are proposing to qualify, through subsequent works' training, for gas engineering and management, it must not be overlooked that there will be others emanating from the department whose services will be of value in the chemical and research departments of the larger of the gas undertakings. Such grounding and training must not be allowed to go begging.

We are pleased to see the increase, though not large, in the number of the full-day students, as well as to learn of the continued interest, which is the best acknowledgment of utility, taken in the courses of lectures provided. We hope that Professor Cobb—this is now the second time that he has called attention to the matter—will continue as long as is necessary to hammer home the truth, and with the desired effect, that these lectures would be of still more value if the general and scientific knowledge of the students was of a wider and deeper character. There is further indication that the laboratory of the department is not made use of to the extent that it might well be by gas students; and, in fact, the response received to the proposed tutorial course in methods of gas-works analysis was so feeble that the scheme has been dropped. But more singular still, in view of the insistent upholding in high places—by prominent members of the Institution of Civil Engineers, including Sir Corbet Woodall (instance of which is found in his address to the London and Southern Junior Gas Association towards the end of 1909)—of the "sandwiching" system of training for engineers being the ideal one (periods of works' training and university study being systematically intermingled), is the intimation in the report that this scheme has been left quite out in the cold, and does not in the gas industry appear to find any favour. Twelve months ago, Professor Cobb, in launching this as one of the features in his projects for a higher usefulness, observed: "It is a "marked innovation, and responds to a demand which has "found frequent expression in the past." The demand was evidently not from the gas or fuel industries. But still, a scheme of the kind having received the endorsement of luminaries of the engineering firmament, Professor Cobb was rightly emboldened to believe that the project would be received with favour by the industries served by his department. There is disappointment in finding that it has not been so. But the shortened (two-year) diploma course for students who are exceptionally prepared in technical subjects has proved useful in two cases. These are not big results, from the point of view of numbers; but we would far sooner see small numbers and good results than the opposite conditions. Nevertheless, in point of view of numbers, progress is being made; and we have not the slightest doubt that patience will see, through the extension of the recognition of educational need and the human certificates of merit that will issue from the department, even numbers increase, and the department a potent factor in the technical manning of the gas industry. Meantime, research actively proceeds under Professor Cobb's direction. We have recently seen some of the preliminary results from investigations now proceeding; and we fully believe that the subsequent results of the research work will alone justify the existence of the department, although it would be a great pity for this educational "resource" of the industry not to be developed to its utmost possible extent. However, in the present position we see the elements of a greater practical service for the gas and fuel industries than have ever been traced before.

Liability for Accidents Arising during Delayed Road Reinstatement.

THE case of *Brame and Clark v. Commercial Gas Company*, as the decision of the Law Courts now stands (and leave to further appeal has been refused), has disclosed a serious defect in section 114 of the Metropolis Management Act, 1895, so far as the protection of users of the subsoil of roads and footpaths is concerned. We called attention to the point when the case had been before His Honour Judge Smyly, at the Bow County Court; and the judgment of Justices Horridge and Lush, on appeal, in effect confirms the view as to the inadequacy of protection to those pipe or cable owners who are subject, in the matter of road reinstatement after pipe or cable laying, to the option of the local authorities as to whether they or the owners shall do the work. It seems that, according to the interpretation of the law, there is no limit, other than that of the taking in hand by the local council of the work of permanently restoring the surface, to the time within which the responsibility of the statutory company opening the road shall continue in regard to any damage occasioned—no matter how tardy the council may be in putting the work in hand. Until they chose to do it—whether the time be reasonable or unreasonable—the company opening the road are liable for any damage arising out of their act. Notice of the finishing of the pipe work may be given; the council may themselves pass a resolution that the work of reinstatement shall be carried out; instructions may be given for the work to be executed—at not one of these events does the responsibility cease of the company who have opened the road. It only ends at any near or distant date when the council's workmen with pick and shovel are on the spot, and actually begin the work of permanently re-establishing the surface.

That is the legal position in respect to road reinstatement to-day—at any rate in the Metropolis, or elsewhere where the local authorities have similar option; and the position can only be described as a monstrous one, and altogether one-sided.

Those interested will remember the case as also the circumstances, as related to His Honour Judge Smyly. The Commercial Gas Company had been executing certain pipe work in Poplar; and the particular section where a woman named Brame and a man named Clark tripped over a paving-stone that had become uneven, and sustained certain injury, was finished on July 28 last year. Notice was at once given to the Council that the pavement was ready for reinstatement; but the accident did not occur until Aug. 5—*i.e.*, eight days after the Company had sent in formal notice of the completion of the work. Meanwhile, the Company's men kept an eye on the temporarily laid paving, and when any unevenness was observed adjusted it. This the Company regarded as quite a voluntary act, and not an obligation. But obligation it turns out to be, even if a borough council or their servants choose to procrastinate in the matter of the work of permanent replacement. The obligation would have been the Company's without question under section 10 of the Gas-Works Clauses Act, 1847, had section 114 of the Metropolis Management Act, 1895, not given the borough councils the right to undertake themselves the work of reinstatement after road opening, and to charge the company who had caused the opening to be made with the expense attaching to the restoration. The Poplar Borough Council preferred to exercise the power conferred by the section; but that position, the Courts in effect hold, removes from the company opening the roads any control over the restoration being carried out with despatch, and leaves to the pleasure of the local authority or their servants the period within which the responsibility of the company shall continue. This indefiniteness is monstrously unjust. There ought surely to be a recognized reasonable time within which the responsibility should change shoulders. So keenly did the Commercial Gas Company feel the injustice of the position and the importance of the case not only to themselves but to the gas industry generally, that they offered, if the Divisional Court would grant leave to appeal to the Higher Court, to bear the cost whatever the result. But, as previously stated, leave was not granted. The only thing that is perfectly clear is that section 114 of the Metropolis Management Act requires amending, so as to put the question beyond all dispute and injustice.

The Synthetic Sulphate of Ammonia Process.

In dealing last week and on a previous occasion with the subject of the new Sulphate of Ammonia Association, we made allusion to the extraction of nitrogen from the atmosphere in Germany, from which, by the synthetic process of the Badische Company, sulphate of ammonia is produced. We know that in some quarters in the British gas industry —not in Germany—these references have been looked upon as a sort of apparition set up with the view of obtaining a general adherence of British sulphate of ammonia makers to the new organization, although there has been an attempt on our part, without making too much of the matter, to show that there is something more realistic and material about the new competition than a mere shadow. Those of our readers whose eyes did not miss the report in our columns last week of the proceedings at the annual meeting of the Society of Chemical Industry, will have observed that both Dr. Messel, F.R.S., in some remarks that he made, and Sir William Crookes, in an address read in his absence by Dr. Messel, alluded to the new process.

Dr. Messel (who is so much behind the scenes in industrial chemistry in this and other countries that his knowledge as to what is transpiring is as good as can be obtained) regretted that there are no signs of the synthetic production of nitrogenous fertilizers being taken up in this country, seeing that Germany possesses no natural advantages over us—"neither "power nor labour being cheap there." We are not at all sure that such a process would do very much good for itself in a country where the home consumption of sulphate of ammonia is only about one-fourth of the existing home supply, and from which country persistent work is needed to cultivate further demand from abroad. Sir W. Crookes gave the additional information that the Badische Company were enlarging their plant, and that, by the end of 1915, its capacity would be 130,000 tons. This is a significant figure. It is only about 50,000 tons less than the total sulphate of ammonia production in 1913 of the gas-works (exclusive of all other coal and shale carbonizing plants) in the British Isles; and certain it is the Badische Company would not extend their synthesizing plant in this manner if they did not find it pay, or if they saw no fair prospect of making it continue to pay—despite what Dr. Messel says about dear power and labour. On the other hand it is equally certain that the Badische Company will not extend their plant at such a rate that they, competing with the existing supply of sulphate of ammonia, would seriously injure their own market.

Sir William Crookes, in his address, also referred to the direct recovery of sulphate of ammonia in connection with coal-carbonizing processes, and, in this relation, he made well-deserved recognition of the great inventive abilities of Herr Walther Feld, whose loss the gas industry deplores. In view of competition from fresh sources of supply, the coal-carbonizing industries—the gas industry especially—ought to explore very carefully the new direct processes of sulphate of ammonia recovery. Sulphate of ammonia is responsible for a considerable revenue; and the question of the cheapest form of production will mean much in the future. We see appeals made for several thousands of pounds for investigating the question of the production and use of alcohol as a motor fuel. The British gas industry ought to be able to afford to make an early and thorough investigation of the question of the processes of sulphate of ammonia production, in order to ascertain as much as is possible concerning which really is the most economical and the most practicable form of working, having regard to the primary product, and not wait until some day (if ever) the costs leak out concerning the synthetic process of producing sulphate of ammonia, which might have a further disturbing effect if they are as low as are hinted at by some people who profess to know. In reality, at the present time, no one outside the Badische premises appears to be aware of what are the exact costs; and it is patent there is a careful guard maintained against the leakage of information on this point. It is for the producers of sulphate of ammonia from the carbonization of coal to protect themselves by all technical means within their power. They must not let reflections upon a past comfortable commercial position obscure present and prospective conditions.

The Gas Industry as Reformer.

Some very useful evidence was last week laid before the Departmental Committee on Coal Smoke Abatement by Mr. Edward Allen, the ex-President of the Institution of Gas Engineers. If, after this evidence, the Committee do not report that Parliament ought to confer upon the gas industry all possible facilities for carrying on the beneficent enterprise upon which it is engaged (under, in the case of private concerns, a regulated profit), the industry will have the right to think the Committee have missed a very fine opportunity, and have strayed from a full appreciation of the important investigation entrusted to them. The industry has done a large amount of work in this direction of abating smoke; it is applying itself sedulously, by means of all the available and legitimate commercial machinery, to doing still more. To what has been done, it is impossible to apply any positive measure other than by reference to the number of appliances fixed, and by giving comparative figures showing the remarkable increase in the consumption of gas during daylight hours. It is pretty certain that, in this air-purifying work, the gas industry could do much more if it had the encouragement, the protection, and the aid of Parliament. The ambition of Mr. Allen is to see the gas industry the universal provider of heat. If it were so, there would be no further question of smoke abatement, and the Smoke Abatement Society could dissolve, cease its operations, close its doors, and retire to meditate upon a success achieved by the inventions and enterprise of an industry practically working while the Society were serviceably agitating. In the evidence published in other columns, it is seen how fresh economies have been achieved in gas-works, and how the price of gas in the past has been reduced. But there is now a bar to the work that is being done by the industry. This bar is not so much to-day (as formerly) popular prejudice against gas or preference for smoke-making fuels, as the action of the monopolist coal-owners in lining their pockets with excesses of charge which ought to go towards the promotion of atmospheric sanitation, by assisting in producing lower prices for gas. But as

things have been, the fresh economies produced of late by the technical successes of the gas industry have been completely absorbed by the coal owners; and so progress has been delayed towards the state of things when gas-works shall be the only recognized place for the reception of coal and its transformation into gaseous and coke fuels, and from which centres householders and industries shall draw the one of the two agents which better suits them.

Mr. Allen has shown the Committee what the industry has done in the home and in the factory; thereby illustrating the things of which it is capable in continuing to reduce the combustion of raw coal in open fires. He believes the time has arrived for the abolition of the domestic coal fire, which is so large a contributor to atmospheric pollution; but he does not like the idea of compulsion. Yet, if we are not to make the emission of smoke by domestic chimneys a penal offence (which is bald compulsion), how is there to be complete success? We ask the question; but we do not like the idea—at present. Nothing in the nature of immediate revolution in this matter is necessary or is practicable. It must be done by soberly devised methods and stages. The great thing is that the industry has the means to produce reformation—the gas-cooker for all; the gas-fire for the upper and middle classes, and for intermittent use even in the houses of the poor; coke for the poor, and generally for continuous use; and water-heating appliances (gas and coke) of many types. For most forms of heating in industry, gas undertakings do, and are ready to still further, cater. There was much said by Mr. Allen about coke; there is not nearly enough said about it up and down the country. But the Departmental Committee have now before them a variety of information that was not formerly in possession of, at any rate, some of the members. That a 44 per cent. radiant efficiency can be obtained with very little attention from a coke fire, as compared with an average of only about 19 per cent. from a coal fire is not the knowledge of all. The old error of some of our industrial friends, too, as to coke causing deterioration of the tubes of boilers had a "knock-out" blow administered by the statement that at Liverpool a Babcock and Wilcox boiler was running from 1895 to 1910 solely on coke, without the renewal of a single tube. Growing experience is dissipating ill-founded notions, and is causing electrical and other engineers to look yet more favourably upon coke as a fuel for steam-raising. If gas-engineers had not in the past kept so much to themselves their own experiences in this regard, we should not have been in the position at this time of day of having to extirpate all the erroneous notions of engineers in other industries on such a simply-disposable matter as this. Mr. Allen's evidence was clearly informative to the Departmental Committee; and it will be read with considerable interest by his colleagues of the gas industry.

The Response to the Presidential Invitation.

A fresh lesson follows the recent meeting of the Institution of Gas Engineers at Liverpool, in connection with the technical proceedings. To fill the blank of oral discussion on the papers, the (now ex-) President, Mr. Edward Allen, suggested that there should be contributions in writing sent to the Secretary for publication in the "Transactions" and the Technical Press. The result of the invitation is exceedingly disappointing. Only three or four members have taken the trouble to communicate their views or experiences on the subjects of the papers; so this process of eliciting discussion of the technical fare provided for the meetings must be taken as a failure. We are not saying anything as to the quality of the contributions that have been made; but the few members who have responded to the President's invitation (considering the extent of the membership of the Institution) show one of two things—a general laxity of interest, or that the incentive of the publicity of a meeting is needed to produce anything like a fair discussion of the subject-matter introduced for consideration. Both are anything but agreeable causes, in an industry the work of which ought to provoke very earnest enthusiasm in discussing topics of common interest and importance. The result on this occasion of posterior discussion by writing indicates that future Presidents must not fall back upon this means of making amends for an insufficient allocation of time for debate, for it is altogether inadequate. However, we will not discuss the matter in view of the editorial on "Institution Programme Reform" in the "JOURNAL" for June 30.

The Coal Position.

If it is not Yorkshire, it is Scotland; and if it is not Scotland, then it is some other coalfield. But somehow or other between them the coal owners and the miners contrive to keep the large coal consumers on tenterhooks, and their respective affairs well in the eyes of the public. It is Scotland now; and the Scotch miners have been wanting to make a national affair of their grievances, and of the enforcing of a simple and improvident remedy, for maintaining their day's income, and for depreciating their week's income. The facts are briefly these: The Scotch coal-owners, in view of the additional costs of working owing to modern legislation, and the fact that there is a reflux in trade, want to reduce wages. The miners' object, and oppose the reduction of the minimum below 7s. a day. Further, they have been proposing, in order to artificially maintain the selling price of coal, and so keep up wages, to restrict output by working only four days a week. The miners do not appear to have the power of viewing things simultaneously from all sides. They would defend 7s. as a minimum per day, and lose a day's pay, rather than give up probably 3d. of the day's minimum. They are not at all strong on economic laws. The foregoing shows it; and so do their inappreciation of the fact that the restriction of output to four days per week might mean the accentuating of the conditions which they seek to remedy by the restriction. It is just possible—industry being extremely sensitive to any meddling with natural economic laws—the Scotch miners might at this time find their proposed remedy for receding prices subversive to their own interests by causing a further decline in demand. When trade is on the ebb, industry is not prepared to pay high-water-mark prices for fuel. However, at the miners' conference last week, while it was agreed to support the Scotch miners in regard to the minimum day's wage, and to take a ballot of the other coal districts to see whether the miners are prepared to go the length of a national strike in support of the Scotch miners, there was strong disapproval of the policy of restriction of output in the manner proposed; so that the Scotch miners are not likely to persist in this.

Results of Coercive Measures.

The miners across the Border would naturally be very pleased if they could get the influence of a threatened national strike to bear upon the protection of their minimum wage; but it is doubtful whether, so soon after the last great national strike of workers, the coal miners will for a time be prepared to embark on another such venture. That strike did not have the immediate effects intended in paralyzing trade and in putting cities and towns to great inconvenience in connection with their gas and electricity supplies. There would be less chance still of a strike doing so now, with fattened stocks at works and at stations. What the great strike did do, however, was to inflict grievous injury upon the whole of the industrial class of workers by shutting-down factories, or putting them on short time; and by causing a rise in the costs of household fuel and other necessaries to working people generally. On the other hand, by the abnormal conditions created, the coalowners were enormously enriched—largely at the expense of the poor, and the miners were enabled, through the same cause, to enjoy a long spell of higher wages. What is the good of these transient and inflated conditions when they cost so much to realize, while a greater permanence of more normal conditions would not result in such great waste? These artificially created advantages always have their after-effects. By arrangement among themselves, the Gas Coal Association have tried again this year to maintain prices, but they have failed; and the managements of gas undertakings would have been foolish indeed to have allowed the owners to have coerced them by their covert understandings as to minimum prices. By being in no hurry to settle contracts, and by shifting the placing of orders, a good deal has been done in making some owners and contractors look more to the protection of their individual interests than to loyalty to combined understandings. And a good thing, too. It seems to us that, if there is combination on one side, there should be combination on the other; and it would not be at all a bad move, in order to help to put an end to the sort of thing that has been experienced this contract season, for gas undertakings to combine and refuse to purchase or take coal from certain collieries next contract season, and so make the resentment over these secret arrangements as to prices something that would be

seriously felt by individual collieries. We know cases this year where there has been a material giving way on prices that had reached the agreed line, solely to save the contracts. The ardent desire not to let the contracts go elsewhere would not have been evinced so strongly had the contracts been worthless from the point of view of profit.

A Bad Trade Union Year.

The national coal strike of two years ago caused widespread loss to employers, and it also entailed an immense amount of suffering among workers affected by it and those dependent upon them. With regard to the employees directly concerned in the dispute, that the loss in wages reached an appalling figure is evident from the effects of the struggle on the trade union funds. Information as to this is found in a report on Trade Unions issued a few days ago by Mr. G. Stuart Robertson, Chief Registrar of Friendly Societies. The period dealt with is the twelve months ended Dec. 31, 1912; and it is stated that the most important feature of that year was the serious depletion of trade union funds. The decrease shown amounts to nearly £750,000, which is 11 per cent. of the funds at the beginning of the year, or over 10s. per member. This condition of affairs is traceable almost entirely to the coal strike, which cost the miners' unions considerably over £1,000,000. The reaction on the many other trades which are more or less intimately dependent upon the coal industry may, it is remarked, be measured by the heavy charges for unemployment pay. For example, the unions in the conveyance group paid out £125,000 in unemployment benefit, or more than ten times as much as in the previous year. Under the same head, the expenditure in the engineering group shows an increase of over £40,000; while several of the smaller groups suffered in proportion. In regarding the coal strike from this point of view, it is perhaps possible to derive some very slight consolation from the reflection that industrial warfare of this kind is becoming so expensive a luxury that soon no one will be able to afford to indulge in it. As to the trade union movement, the report states that there has to be recorded for 1912 an increase in membership of nearly 250,000—a growth nearly as important as that chronicled for the previous year. At the close of the period referred to, there were upon the register 683 unions, of which 644 made returns. Their membership was over 2,500,000. There was an income of nearly £3,900,000; and the expenditure included £600,000 in unemployment benefit, nearly £1,700,000 in dispute pay, £500,000 in sickness and accident benefit, and a like sum in benefits of a miscellaneous character. These figures indicate the important position held by "dispute pay" in relation to the various "benefits." The funds of the registered unions at the end of the year amounted to £5,617,927.

PERSONAL.

Mr. Charles Carpenter, who has been nine years in the service of the Cardiff Gas Company, has been appointed, from among 55 applicants, Financial Officer to the Neath Corporation Gas Department, at a commencing salary of £150 a year.

Mr. Harold Shewring, a nephew of Mr. F. Shewring, of Droitwich, has passed the intermediate B.Sc. (Engineering) Examination of London University. Mr. Shewring was articled to Mr. Harold E. Copp, and is now under Mr. W. H. Johns, at West Bromwich.

Mr. Sidney O. Stephenson, Engineer and Manager of the Tipton Gas-Works, has been appointed Engineer and General Manager of the Worthing Gas Company, in succession to Mr. W. A. Walker. Mr. Stephenson has held his present position for thirteen years, having been selected for it, out of 21 candidates, in June, 1901. Before going to Tipton he was with Mr. Thomas Glover.

On Friday last, at the monthly meeting of the Oswaldtwistle District Council, a cordial vote of thanks was accorded to Mr. W. W. Simpson, J.P., for the gift of the portrait of his father, the late Mr. Thomas Simpson, who was Chairman of the old Local Board in 1864, and whose action in securing for Oswaldtwistle the gas and water undertakings during his term of office was eulogistically referred to.

In the next column of the "Journal" will be found the list of prize winners at the last examinations in "Gas Engineering," "Gas Supply," and other subjects. It is interesting to notice that the winner of the silver medal in the two named is Mr. Tom Rudge, who last year took the second prize (£1 10s. and a bronze medal) in each subject—a "double event" on which we offered him our congratulations, as it certifies to good all-round technical knowledge. They are still more deserved on the present occasion, as we cannot remember an instance of similar success at the City and Guilds of London Examinations. Mr. Rudge was a pupil of Mr. Hubert Pooley when he was at Stafford, but was with him only a few months. When, however, Mr. Pooley went to Leicester, he continued to take part in directing his former pupil's studies, which he will be pleased to find have been attended with so much success.

In response to an advertisement which appeared in a recent issue of the "Journal," there were fourteen applications for the position of Works Superintendent to the Birkenhead Corporation gas undertaking, under the Engineer (Mr. T. Ormiston Paterson). One of these was Mr. D. U. R. Pearson, who has been Chief Draughtsman there for the last five years, during the course of the works extensions. It was thought, all things considered, that, with his knowledge of the works, he would ultimately make the best man for the position; and the Committee have therefore appointed him, subject to the confirmation of the Council at to-morrow's meeting. Mr. Pearson served his time with Messrs. Head, Wrightson, and Co., of Stockton, and was subsequently with the Whessoe Foundry Company, the Exeter Gas Company, Messrs. Ashmore, Benson, Pease and Co., the Bradford Corporation Gas-Works, and Messrs. Newton Chambers and Co. He has thus had very wide experience.

CITY AND GUILDS EXAMINATIONS.

The Prize Winners for 1914.

In the "Journal" for the 14th inst. (p. 103), the list was given of the candidates who passed the last examinations in "Gas Engineering" and "Gas Supply" in the Department of Technology at the City and Guilds of London Institute. We have now received from the Superintendent of the Department (Sir Philip Magnus, M.P.) a list of the prize winners in the subjects named, as well as in those of "Coal-Tar Distillation and Products" and "Heating and Ventilating Engineering." The following are their names, and the centres at which they studied.

Gas Engineering.

Final.—First prize (£3 and a silver medal), Tom Rudge, Birmingham Municipal Technical School.

Grade I.—First prize (£2 and a bronze medal), Walter Alfred Barnett, London County Council School; second prize (15s. each, being equal, and a bronze medal), Ernest Walker Muddiman and Leonard Howard Thomas, Birmingham Municipal Technical School; third prize (a bronze medal), Clifford Duncan, Hull Municipal Technical College.

Gas Supply.

Final.—First prize (£3 and a silver medal), Tom Rudge, Birmingham Municipal Technical School.

Grade I.—First prize (£2 and a bronze medal), Horace Gordon Beesley, Birmingham Municipal Technical School; second prize (£1 10s. and a bronze medal), Alexander Low Edwards, Liverpool Municipal Technical School; third prize (a bronze medal), James Elliott Pratt, Liverpool Municipal Technical School.

Coal-Tar Distillation.

Final.—First prize (£1 each, being equal, and a silver medal), James Clark Smith and Cyril M. Warren, East Ham Technical College.

Grade I.—First prize (£1 10s. and a bronze medal), Douglas Robinson Wattleworth, Workington Technical School; second prize (£1 and a bronze medal), John Edward Ford, East Ham Technical College; third prize (a bronze medal), Percy Beriston Ridout, Tunstall Victoria Institute.

Coal-Tar Colouring Matters.

Grade I.—First prize (£1 10s. and a bronze medal), Arthur John Crockatt, Leeds University; second prize (£1 and a bronze medal), Herbert Holroyd Stocks, Leeds University; third prize (a bronze medal), Fred H. Pollard, Manchester Municipal School of Technology.

Heating and Ventilating Engineering.

Final.—First prize (£2 10s. and a silver medal), John Ernest Evan Baskerville, London County Council School.

Grade II.—First prize (£2 and a bronze medal), Archibald Morris Daniel, Croydon Central Polytechnic; second prize (£1 10s. and a bronze medal), Gilbert R. Jackson, London County Council School; third prize (£1 and a bronze medal), William John Dees, Regent Street Polytechnic.

South Metropolitan Gas Company's Dividend.

We learn from the Secretary of the South Metropolitan Gas Company (Mr. F. M'Leod) that the accounts for the half year ended 30th of June show that (subject to audit) the balance to the credit of the net revenue account will enable the Directors to recommend payment of the statutory dividend at the rate of £5 9s. 4d. per cent. per annum, carrying forward to the next account the sum of £26,748. This time last year the dividend was at the same rate; but the carry-forward was only £1206.

INSTITUTION OF GAS ENGINEERS' LIVERPOOL MEETING.

Correspondence Arising out of the Contributions Read.

We have received from Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, the following correspondence contributing to the discussion arising out of papers read at the recent Liverpool meeting.

THERMAL PHENOMENA IN CARBONIZATION.

Dr. R. V. Wheeler congratulates the authors on the ingenious method of experiment they have devised, and offers the following observations: Referring to the heating curves published in the report, he does not consider that, because the coals had been dried for one hour at 110° C., it can be assumed that no moisture would be expelled between 100° C. and 150° C. In a recent paper by Burgess and himself [see "Trans. Chem. Soc. 1914," Vol. 105, p. 132], it was pointed out that on distillation of thoroughly dried coal in a vacuum there was always a copious evolution of water at about 175° to 200° C., which was assumed to be water of constitution—how combined it is difficult to say.

He is doubtful about this one point in the authors' conclusions, which otherwise some observations he has made tend to confirm. In a private communication to Professor Cobb, he says that in some early experiments on the distillation of coal in a vacuum, he had a nitrogen thermometer embedded in the coal, and always found a considerable drop in temperature (20° or 30° C.), as soon as oils began to be distilled—*i.e.*, at about 310° C.—and another drop at 450° C. As a result of this observation, he tried to find out if there was any marked thermal change below 350°, by heating coal contained in a quartz tube, in an electric sand-bath having a thermocouple in the coal and a similar couple in the sand-bath, and raising the temperature gradually. So far as he could judge by so rough a method, the heating curves obtained—*i.e.*, the time-temperature curve for the coal and the time-temperature curve for the sand-bath—were exactly the same up to 350° C. Above 350° C., the rate of heating of the coal fell off slightly.

The authors' work, in his opinion, seems to cast doubt upon Euchène's results, and to indicate that if the carbonization of coal is not an endothermic process, there is little evidence of its exothermicity.

He believes the hypothesis that the oxygen-bearing compounds in coal are responsible for heat evolution to be correct, for the following reason: When air is drawn slowly through powdered coal, the temperature of which is being gradually raised by an external source of heat, a temperature is at last reached at which fairly rapid combustion of the coal begins. This temperature, which can be called the "temperature of self-heating" is quite low (it ranges from 150° C. to 200° C.), and varies with the coal according to a well-defined rule—so far as bituminous coals are concerned, at all events—that the higher the oxygen content of the coal the lower the temperature of self-heating. This can only mean, in his opinion, that the oxygenated compounds in coal play a part in its spontaneous combustion. [See Dr. Wheeler's evidence before the Home Office Committee on Spontaneous Combustion.] According to this theory there can be actual self-heating of coal, after a certain temperature has been reached, by atmospheric oxidation; the oxygenated bodies giving an extra fillip to the reaction.

CALORIFIC POWER AS A STANDARD.

Mr. Charles F. Botley (Hastings) writes: I welcome this paper as most opportune, and as bringing the authentic history of an important subject up to date. All those interested must feel particularly indebted to the Gas Light and Coke Company, the Liverpool Gas Company, and their officers, for taking the initial steps in obtaining parliamentary sanction for the abolition of the illuminating power standard and the substitution of the more rational one for calorific or heating power. It does not, however, follow that the standards and conditions which have been decided upon in these two cases are acceptable to all of us, or that they must necessarily be regarded as precedents. Indeed, I believe it is correct to state that in the case of Liverpool the circumstances were exceptional, and are not to be so regarded. At Hastings the matter of calorific value of the gas supplied has received attention for many years past; but the investigations and results are influenced by the fact that, in order to maintain the fifteen-candle power standard (No. 2 "Metropolitan" burner), enrichment is necessary, for which *inter alia* carburetted water gas is used. It is also possible that the tests recorded are on the low side; being, for 1913, 538 B.Th.U. gross, average—571 maximum, and 514 minimum.

As already pointed out in the discussion, it is most desirable to avoid the confusion of standards, as has been the case with photometry; and the expression for the heating value should undoubtedly be in B.Th.U. gross, or, better still, total heat value, bearing in mind that the instrument employed should be one which would give the maximum from the gas tested. Apart from the suggestion of a Committee of the Institution, is it too much to hope that the recognized manufacturers of apparatus will collaborate and produce a standard instrument which in the hands of various users will give concordant results?

Under the conditions of gas supply to-day, I do not think that too much importance can be attached to this calorific standard; and I look forward to the possibility of gas being sold on a heat-unit basis, and on the efficiency of apparatus being given by makers in similar terms. From the point of view of the utilization of the raw material and the possibility of selling gas more cheaply, the heat-unit basis shows advantage. In my own case and standard of working, the B.Th.U. per ton are 6,000,000, compared with 6,720,000, a figure stated recently by a "Works Engineer" in the "Journal of Gas Lighting," or as compared with 8,395,000, the result of Mr. Goulden's recent experiment.

My experience at the present time—and I have, whenever the opportunity has presented itself, advocated the same—favours a general working standard of 500 units total heat value. With the penalty clause and one day's testing, as now proposed, I think there should be some margin before penalties apply, such margin to vary according to the conditions of any particular place; the coal available being the chief factor. I prefer this to having a higher standard fixed and working between such standard and the penalty-line. It must, not, however, be forgotten that eventually a lower general standard than 500 might be commercially advantageous to all concerned.

LIME AND SULPHATE OF AMMONIA AS FERTILIZERS.

Mr. Thomas Canning, of Newport (Mon.), writes: I consider that Mr. West has at a very opportune moment introduced, with much directness and clearness of treatment, a paper on a subject of the greatest importance. I am not going to criticize any of the statements made by him, but to offer a word or two in connection with his general advice that the Sulphate of Ammonia Committee should get into direct touch with the farmer, and persuade him to purchase the valuable manure described. This is highly desirable, but it does not seem to me very easy of achievement. We may get into contact with the farmer, and do more harm than good. This has been done already, and farmers who use nitrogenous manures prefer almost any to sulphate of ammonia. This is chiefly (not altogether) because those who have attempted hitherto to explain to the farmer the value of sulphate of ammonia, have been incapable of teaching him—or, at any rate, have failed to teach him—how to use it. Though they may have had some chemical knowledge, they were not drawn, I believe, from the class of scientific agriculturists who had made nutrition of plants a study. Preference for nitrate of soda prevails among those farmers who have been scientifically trained; so that, at the present time, the United Kingdom takes about one-twelfth of the total production of nitrate of soda. Belgium takes about an equal share, France and the United States about one-sixth each, and Germany rather more than one-third of the whole. It will be noticed from Mr. West's paper that Germany consumes a very large quantity of sulphate of ammonia also; and therefore it may be taken that the German people are better trained in scientific farming, and know better the value of fertilizers than does the English farmer. Still, like the farmer in this country who has received a scientific training, the German farmer takes

more nitrate of soda, in proportion, than he does sulphate of ammonia.

In what I am about to say I do not profess to give any results of research on my own part. I have looked on a new side of the question, and have collected some of the views entertained by those who are connected with agriculture (not those who are connected with the manufacture of sulphate of ammonia), and who have studied the question of nutrition of plants scientifically and practically for years. I think a consideration of their views is likely to render very great assistance to makers of sulphate of ammonia, leading to a more extensive use of their valuable manure by the farming community throughout Great Britain than has hitherto been the case.

It will be noticed in his paper that Mr. West draws particular attention to the fact that on one farm treated entirely on scientific lines, by using artificial manure for the whole of the meadows, pastures, and other crops, and where sulphate of ammonia proved efficient, these lands were in two successive years well limed. This is a considerable part of the secret. Sulphate of ammonia has to be decomposed by calcium carbonate, with the production of ammonium carbonate, before nitrification takes place. The reaction is commonly taken to be one of double decomposition, represented by the formula—

$$CaCO_3 + (NH_4)_2SO_4 = (NH_4)_2CO_3 + CaSO_4.$$

Mr. West has given directions as regards the mixing, &c., of sulphate of ammonia with other manures; and I will therefore not touch upon this, because the results published by him show the correctness of his system.

In a soil deficient in calcium carbonate, or where calcium carbonate is entirely absent, the process of nitrification is delayed, or absolutely stopped. Where there is abundant calcium carbonate in the soil, the results with most crops have, I believe, been reported as equally good as, or even better, with sulphate of ammonia than with nitrate of soda. So that, as a nitrogenous manure, sulphate of ammonia is as effective, nitrogen for nitrogen, as nitrate of soda or as any of the cyanamides; and therefore it ought to be the superior nitrogenous manure of the three, for pure salt of sulphate of ammonia contains 21·2 per cent. of nitrogen, and a good salt of commerce will have 95 per cent. purity. But let me roughly put this at 20 per cent. nitrogen, that would yield 24 per cent. ammonia. Now, if we take nitrate of soda as sold exhibiting 95 per cent. of purity, this means 15·7 per cent. of nitrogen, yielding only 19·1 per cent. of ammonia. The analyses of the cyanamides show about the same percentage of ammonia as nitrate of soda; so that from what I have said in this paragraph it must be concluded that the gas authorities have in sulphate of ammonia the richest source of nitrogen. It therefore follows that if nitrate of soda were selling at (say) £9 per ton, sulphate of ammonia should realize £12 per ton.

But a very serious attack upon sulphate of ammonia has been made by not a few who have used it, because of the resulting acidity of the soil. How far this arises from the absence of calcium carbonate I am not competent to say; but that it does arise in soils in which are present considerable quantities of micro-fungi with partial or total absence of calcium carbonate, is quite certain. These fungi and various moulds absorb the nitrogen for their own nutrition, and set free the acids with which the ammonia was combined. When these acids are set free without meeting any calcium carbonate to neutralize them, they combine with calcium in other forms in the humus, and set free the humic acid, giving rise to the acidity complained of, which only increases by the additional use of sulphate of ammonia. Therefore, before sulphate of ammonia is recommended for any particular soil, the soil should be examined by a chemical expert, and this expert should not only be a chemical expert but also an expert in agriculture.

That Mr. West is also of this opinion is clearly evident from the fact that he did not hesitate to consult the Principal of the Midland Agricultural College on various points. To this fact I desire respectfully to draw the attention of all managers of gas-works.

It may be said that, if farmers having a scientific education still prefer the nitrogenous manure as nitrate and not as ammonia sulphate, further teaching might be productive of an adverse effect on the sales of sulphate of ammonia. This certainly need not follow as a consequence. My view is that up to the present the question has never been properly investigated. Sulphate of ammonia has been recommended haphazard in many places, and used haphazard, whereby a prejudice has been created against its use in Great Britain. The cases in which it has been scientifically tried and applied to the proper soil and the proper class of roots have been few. My object is that they should be made numerous; and it would be very desirable, in order to carry this out, if gas managers got into touch first with the Directors of Agricultural Education in their respective counties, and sought to obtain from them advice and assistance, to have trials made, under suitable conditions in different parts of each county, by qualified men.

It must not be supposed that nitrate of soda as a manure is not without its defects. Its use either repeatedly or in considerable quantities produces a very bad effect in heavy soils. This may be owing to its hygroscopic character, a point, however, which is disputed. But what is not disputed, as I gather from the reports of those best qualified to judge, is that there is a marked deterioration where it has been constantly used.

Hall, in his admirable work on "Fertilizers and Manures," gives it as his opinion that the best plan is to use a mixture of the two fertilizers (nitrate of soda and sulphate of ammonia), because, as he points out, the nitrate is employed for the immediate use of the crops, while the nitrification of the ammonia continues the supply at a later stage; and that, as nitrate of soda is a producer of alkali, and sulphate of ammonia causes acidity, they would, therefore, neutralize one another in the soil.

The electrical fixation of nitrogen, and the production of calcium nitrate by the extraction of nitrogen from the atmosphere, have rather alarmed producers of sulphate of ammonia. No doubt no selfish reasons ought to prevent anybody wishing well to processes that would benefit the whole human race by rendering available the inexhaustible supplies of nitrogen in the atmosphere; but it cannot be done for nothing. It will be remembered how, in a very few months, the great Niagara installation had to be closed. Of the factories that are now putting calcium nitrate on the market, it may be said that the rate of production is not very great, and the cost of manufacture prohibits it being sold at a profit—at all events, under £8 or £9 per ton, which would be equivalent to sulphate of ammonia, nitrogen for nitrogen, at from £12 to £13 per ton.

In conclusion, it may be said that Mr. West's paper is not only opportune, but is a very suggestive one, well worth careful study by every member of the Institution, and by the farmers of Great Britain in particular.

Mr. Charles F. Botley (Hastings) writes: I think all the members of the Institution, and particularly those resident in the Provinces, should feel very much indebted to Mr. West for his convincing paper. It has been frequently said that an engineering training or experience is the best possible basis for a successful business career. The paper affords an excellent illustration of this. It is unfortunate, however, that many farmers are without the necessary knowledge as to the advantage of proper artificial manures, and in some cases, perhaps, means are lacking. But there is no reason why we should not, as opportunity offers, co-operate with the agriculturist. Personally, I appreciate the information and suggestions which the author has given, and greatly hope that his further experience may be entirely successful in every respect.

Mr. Osmund Wilcocks, a solicitor in the town, has been appointed a Director of the Plymouth and Stonehouse Gas Company, in place of the late Mr. John Shearne.

Mr. Nathaniel W. Gifford, the General Manager of the East Boston Gas Company, Massachusetts, and the Secretary-Treasurer of the New England Association of Gas Engineers, is in England on a visit, and being interested in the public lighting of Boston has been inspecting the up-to-date lighting of the streets of the Metropolis under the guidance of Mr. W. J. Liberty, the Public Lighting Inspector for the City of London.

At a special meeting of the Macclesfield Gas Committee last Wednesday, steps were taken to fill the vacant position of Gas Manager. Five candidates had been selected to appear before the Committee; and at the final voting two remained—Mr. W. S. Sowerbutts, of Stockport, and Mr. J. E. Blundell, of Southport. Mr. Sowerbutts was called into the room and informed that he had been selected for the post; but subsequently the Town Clerk, on checking the voting papers, found that, in some inexplicable way, a mistake had been made, and that nine votes had been cast for Mr. Blundell as against eight for Mr. Sowerbutts.

ELECTRICITY SUPPLY MEMORANDA.

We have just been reading an absurd little paragraph headed "Dangers of the Electrical Home," in which "Meteor" of the "Electrical Times" tells of a child, three-and-a-half years old, who, brought up in an all-electrical home, was so ignorant that she did not know what a red-hot cinder was; and so, on visiting a factory, seeing one fall from a furnace-door, she picked it up, with, we may take it, painful consequences to her fingers. We turn from this pretty tale to the annual report of Mr. G. Scott Ram, Electrical Inspector of Factories, to learn that, in factories other than electrical stations, there were in 1913 no less than 418 electrical accidents, of which seventeen were fatal. This presents a "considerable increase" from the 283 electrical accidents and fifteen fatalities in factories of the preceding year. This state of affairs leads Mr. Scott Ram to comment upon the fact that in many works, operated and lighted electrically, there is no one employed who is technically qualified to look after the plant. Even if the plant is good and well-installed in the first instance, it is often run without technical supervision until trouble arises, and accidents occur. This being so, we may look for a further growth in the number of accidents in the future, unless there are added to the costs of electrical operation the salary of a qualified technical man, and the expense of keeping the installation in perfect order. Not all installations are of high merit when first made; for the Inspector speaks of apparatus of a "cheap and flimsy" character. In public supply electricity stations, and on electrical railways and tramways, there were 65 accidents and one death due to electrical causes, and at other stations 29 accidents and one death. Commenting on the total number of accidents—well over 500—Mr. Scott Ram says that, though it is small, averaging not more than one in perhaps a hundred works, "the conditions conducive to accident are present in a very much larger proportion, and, in many works visited, it appears to have been purely a matter of good fortune that accidents have not occurred." There seems to be a large amount of abuse of the Home Office regulations to be found in factories up and down the country.

Increase in Accidents and Fatalities.

Reverting to electrical accidents in factories, we will not mention the whole of the items in the analyses, but will take just the first four to show to what common causes accidents may be due. No less than 56 of them arose from the arcing of switches, 17 from the arcing of fuses, 35 (one fatal) from shocks or burns when replacing fuse wires, and 66 (three fatal) through portable apparatus, connections, and flexible wires. The three last-mentioned fatalities, be it marked, were due to portable apparatus; and the electrical industry is now trying hard to push portable apparatus and the use of flexibles in the home. It is just as possible for accidents with flexibles to happen in the home as in the factory. Of the 66 accidents in the "portable apparatus" item, 27 were due to the careless handling of the connectors and 20 to the flexibles. By the use of connector plugs of the hand-shield or other safety type, or connectors protected by a switch so arranged that the plug can only be put in or out while the switch is in the "off" position, there could be a considerable avoidance of the accidents due to the handling of connectors; but the accidents with flexible wires are a different matter. In the home technically qualified electricians, as a rule, are not kept, and there, as in factories, flexibles will become worn out and dilapidated. When this condition arises, then difficulty may be expected. The "Electrical Times" was calling attention to this very matter, and the danger, only the other week [*ante*, p. 85]. Nearly every year Mr. Scott Ram has something to say about the trouble with the flexible connections of electric irons; and this year he remarks: "Considerable trouble is often experienced with the flexible conductors for electric irons, short-circuits occurring at the point where they are led away from the iron, due to the constant bending of the wire and insulator, and to the heat from the iron." There is one thing about electricity that is uncomfortably different from gas; and it is that deterioration of the appliances and connections may go on quite unobserved until one day something happens that is anything but pleasant. The uncertainty of this kind of thing is one of the accompaniments of electrical operation.

The Danger of Flexibles.

The ordinary pressures of electricity supply in this country range between (say) 200 to 250 volts; and Mr. Scott Ram refers to various fatalities at these voltages. It makes sombre reading this account of the grimly-rapid transit from life to death through electrical means. Two or three instances will suffice here. One of the fatalities occurred in a motor-car shed, in which the lighting was by 200-volt alternating current. In order to provide for the use of a portable lamp, two wires about 4 feet in length were connected to the circuit at a ceiling-rose of a pendant fitting. Instead of using a "properly constructed connector," the ends of the flexible wires were twisted on to the ends of the wires from the ceiling rose by a man standing in a car whenever the lamp was required. At the time of the accident, there was no portable lamp connected, and the wires from the ceiling rose were hanging down; the live ends being unprotected. Three men were pushing a car into the shed when the metal frame of the wind screen came in contact with the live wire. Two of the men received shocks, and one was killed. Another fatality occurred in an engineering works. A connector socket for use with a portable lamp (200 volts alternating) was fixed to a drilling-machine. The protecting cover of the connector had been broken, leaving the live contacts exposed. The machinist climbed up to do some oiling, and put his hand on the live contacts. He was killed. A third fatality was due to the non-earthing of the guide wires and winch of the raising and lowering gear of an arc lamp (220 volts alternating). A leakage occurred in the lamp, rendering the framework live and also the guide wires. A man took hold of the latter. He, too, was killed. Even at an electrical station, there was a fatality due to a man receiving a shock (230 volts alternating) from the flexible conductor of a hand lamp; the insulation being practically worn out, and in a dilapidated condition. The "Electrical Times" is not likely to make use of these particulars from Mr. Scott Ram's report for its sample advertisement copy for the use of electricity undertakings engaged in abusing and slandering gas, in the endeavour to develop business. The "Electrical Review" has reported several fatalities due to electrical causes during the current year; so that we cannot expect that Mr. Scott Ram's report for 1914 will be without its melancholy side.

In the Midst of Life—

The makers of electric-cookers have hitherto (save those of the biscuit-tin form) drawn their ideas from the experience and practices of the gas industry; but externally the form of one cooker that has been developed by the Electrical Company, Limited, rather appeals to us in view of the recent contrasts of German designs with British designs of gas-cookers. People have been speaking of the good appearance of the gas-cooker of German make (as seen at the Munich Gas Exhibition), built of sheet-iron, with white enamelled surfaces; and doubt has been raised in our mind as to the expediency, on account of durability, maintenance of good appearance, and heat efficiency, of utilizing for gas-cookers, for the sake of first cheapness, sheet iron with enamelled surfaces. The electric-cooker that has attracte dattention in this connection is of cast-iron, with the outside white enamelled; so that the structure is not subject to the same expansion, contraction, and buckling which we anticipate would occur with sheet-iron, and which we fancy would before long prove disastrous to the enamel through its cracking and chipping. The enamelled cast-iron surface enables the cooker to be frequently washed. One writer describes the cooker as being of "more artistic and pleasing appearance" than any cooker he has seen of the electrical class. The mountings and fittings are all nickel-plated and polished, which, of course, is unnecessary in the kitchen where cookers are to be subjected to hard wear, such as in the house of a consumer on the prepayment system. Another suggestion derived from this electric-cooker is the convenient drop doors. The cooker is only 33⅜ inches high; and the interior is divided into two compartments, with a drop door to each, so that whatever is cooking inside can be drawn out on to the shelf formed by the door. There are disadvantages in the double compartment arrangement. The oven is at the bottom; and the top compartment is for use as a hot cupboard for keeping pastries, plates, and food warm. The size of the oven is only 10 in. by 15¾ in. by 21 in., and one would have to get into close contact with the floor to see well into the oven. We like the idea of the double drop-doors and the shelves thus provided, but not the fixed division of the oven necessitated by them in this form of construction. Why could not the oven-doors of gas-cookers be constructed with a couple of panels forming drop-doors (and supplying shelves when open) in the same way; these being connected to a frame with side hinges and a latch as now, so that the whole door could be opened when necessary for the admission and drawing out of any large articles that were being cooked? In several ways there would be convenience in the double drop panels, especially if there were runners on the sides of the oven, so that trays could be put in exactly on a level with the open panel.

Pleasing Cooker Exteriors.

A discussion has been running in the "Electrician" on the subject of the relative propriety of the rateable value system of charging, *plus* ½d. per unit, and the Poplar system of charging a lump sum on each use, calculated on maximum demand combined with diversity factor, with also ½d. per unit in addition. The total result of the discussion is to show that there is little that is rational about either system, and that the diverse conditions of houses and of households cause, under both systems, the consumers to pay different prices for the electrical service rendered. The more this babel over the tariffs of electricity supply continues, the better, because then the more the fundamental weaknesses of the systems will be disclosed. As to the rateable value system, there is no relationship between the rateable value of a house, and the cost of the provision of electricity, nor between rateable value and the extent of the consumption of electricity. To try to assume a connection between the one and the other is not what one expects from persons possessed of all human faculties. Fundamentally, there is more sense in the Poplar system; practically there is less. To the consumer it must be much more complicated than the rateable value system; and he

Confusion of Tongues.

will regard as simple gibberish any talk to him of kilowatts and diversity factors. Under this system, too, when consumers begin talking among themselves of the amounts of their accounts, the system of assessing the lump sum will fall under grave suspicion. Simple tariffs are what are required for business; and no tariff with a lump sum attached will be popular among people who look upon lump payments for rates and taxes as one of the curses of civilized life, and who have no more lump sums to spare for anything. Another objection to the rateable value system is that it gives preferential treatment to the occupant of a low-rated house over the occupant of a high-rated house, the electricity consumptions in which are equal.

Examples. In a letter by Mr. F. W. Purse, the Electrical Engineer of Carlisle, he gives an example of a house of £26 rateable value, and consuming 3128 units (rather a high consumption for such a house) in twelve months; and he works out the charges on both the rateable value system and the Poplar system. The consumptions for the different purposes are estimated as follows:

General lighting	250 units
Occasional lighting	50 ,,
Cooking	2828 ,,

On this basis, the following are the comparative costs:

Rateable Value Charge.		Poplar Charge.	
12½ per cent. on R.V.	£3 5 0	0·352 kw.	£1 8 0
250 units at ½d.	10 5	250 units at ½d.	10 5
(Average 3¼d.)	£3 15 5	(Average 1⅞d.)	£1 18 5
50 units at ¼d.	2 1	0 32 kw.	6 5
		50 units at ¼d.	2 1
(Average 3½d.)	£3 17 6	(Average 1⅝d.)	£2 6 11
2828 at ¼d.	5 17 10	2 4 kw.	19 2
		2828 at ¼d.	5 17 10
(Average 0·75d.)	£9 15 4	(Average 0·71d.)	£9 3 11

Now there is no sound reason whatever why, under the rateable value system, the lighting units should bear the whole of the lump sum charged, seeing that every unit, for whatever purpose used, requires everything from the machinery onwards for its production. Here we have only 300 units employed for lighting in one year, while 2828 units are supposed to be used for cooking. Why the average of less than one unit per day for lighting should be charged out at about the same as the total charge for an average per day of eight units for cooking—the whole of the lump charge being placed on lighting, though the eight units require more machinery, occasion more depreciation, and need more fuel and other expenditure—is not easy of explanation. When the good electrical times come, when every house will have discarded gas, when the electricity consumption for cooking in every house will be about nine times greater than that for lighting, the lighting thus becoming a mere drop in the output of electrical energy, and so a subsidiary branch of the business, will the drop still under the rateable value system have to bear the burden of the whole lump sum? What is being done now in this regard is only possible owing to the consumption for cooking representing the mere drop in the total output. If the aspirations of the electrical industry are ever realized, the boot will be on the other leg. Another anomaly in connection with the contention that the lump sum should all be placed on the lighting units is that in London and suburbia much of the cooking has coincidence with the lighting load; and so for the cooking units, as a matter of fact, more ought to be charged than is charged for the lighting ones. Then we come to another point, and that is by what right at Poplar is a consumer who pays a lump sum and an average of ¼d. per unit, allowed to have units for lighting at 1⅜d., while other consumers have to pay on the flat-rate 5d., 4d., and 3d.?—these flat-rate payers being the best producers of revenue that the Poplar Department has for the smallest service rendered. It looks as though, while the Department continues to extract money from the lighting consumers at the rate of 5d., 4d., and 3d. per unit, and at the same time charges only 1⅜d. per unit for lighting under another system, "undue preference" is being given to the latter. For justice to be done, the flat rate should be brought down to somewhere near the 1⅜d. figure. As a matter of fact, what happens is that the users of units in the foregoing illustration get, under the rateable value system, their supply for any purpose at an average of 0·75d. per unit, and under the Poplar system at 0·71d. per unit. These figures, which continue to slide downwards the higher the consumption in a house, do not allow for an average of all costs (including capital expenditure, maintenance, &c.), and so they are running on perilous lines.

Contrasts. Now to contrast with the average prices paid by the small house rated at £26, the "Electrician" makes a calculation on a house rated at £100 a year, and using 500 units for lighting and 5000 for cooking per annum. The comparison stands as follows:

Ratable Value Tariff.		Poplar Tariff.	
12½ per cent. on £100.	£12 10 0	0·7 kw. at £4	£2 16 0
5500 units at ½d.	11 9 2	7·65 kw. at 8s.	3 1 3
		5500 units at ½d.	11 9 2
	£23 19 2		£17 6 5
Average price per unit = 1·04d.		Average price per unit = 0·76d.	

There we have illustrated one of the absurdities of the rateable value system. The average charge for a house rated at £26, and in which 3128 units a year are consumed, is 0·75d. per unit, while the tenant of the house rated at £100 a year, and consuming 5500 units (or 2372 units more) has to pay 1·04d. per unit, or 0·29d. per unit more! Even on the Poplar tariff, there is a small difference per unit to his disadvantage, which there ought not to be. But under the rateable value system, the tenant of the house rated at £26 is surely getting an undue advantage over the tenant of the house (and the larger consumer) rated at £100.

Increase in Prices. While certain undertakings run by local authorities are cutting prices with the object of obtaining a footing for electric cooking appliances, we hear of the Boards of certain private Metropolitan concerns who are raising their prices. One of the Companies operating in South London a short time since gave notice of an increase; and it is now learned that just recently the Charing Cross, the Metropolitan, and the St. James's and Pall Mall Companies intimated to the Westminster City Council (with whom the Companies have contracts) that, owing to the increased cost of coal, oil, and materials, they are compelled to increase the charge from 2½d. to 3d. per unit for lighting purposes. The Charing Cross Company propose to increase the charge for power purposes from 2d. per unit to 10s. per kw. of connected demand, *plus* 1d. per unit consumed. The St. James's Company are making no change, at 1d. per unit consumed, and a fixed charge of 7s. 6d. per rated horse power. The increases come rather late in the day, seeing that the prices of coal and oil are easier than a year ago.

THE ANALYSIS OF FUEL.*

The text-book on the "Examination and Thermal Value of Fuel" which Messrs. Coste and Andrews have prepared should prove very useful to analysts who are not well versed in the methods of analysis and in the calorimetry of fuels, and who may be called upon from time to time to examine them. Whether it will assist analysts greatly in reporting as to the industrial value of the fuel they have examined is, we think, dubious; for the authors do not appear to have dealt to any purpose with the important question of the interpretation of the results of analyses and calorific tests. Yet this is what the engineer and the commercial man quite properly expect of the chemist when they appeal to him for advice on the quality and value of a fuel, though we regret to say that in far too many cases their expectations have been doomed to disappointment.

Too many self-styled fuel chemists of the present day have preached to their clients and the public at large that fuel should be bought on the basis of the results of tests of its calorific value, and only the relatively few chemists who are imbued also with the instincts of the engineer (using the term in its broad, original sense) have made the necessary reservations and pointed out that of two coals identical in calorific value one may have a very much higher evaporative power than the other. The facility with which tests of calorific value are made with the bomb calorimeter has contributed to the movement in favour of assessing coal by the results of these tests. Yet disillusionment must follow in many cases if the results are taken as the sole, or even chief, criterion of value of coal. It is because we feel that much mischief has ensued from the widespread adoption of the calorimeter without an intelligent appreciation of its limitations as an agency for evaluating the practical utility of a fuel—a solid fuel in particular—that we fear that further mischief may be done if text-books such as that of Messrs. Coste and Andrews find their way into the wrong hands.

The chemist-engineer who intuitively takes a comprehensive view of the conditions of use of a fuel and the significance of its qualities or properties in relation to those conditions may, of course, safely use this text-book, and will find it very useful as a guide to the laboratory manipulation of apparatus and the operations of testing. On many analytical processes, however, he will find the book of little service. For instance, the estimation of nitrogen in solid fuel is a matter of great importance in connection with the ammonia recovery producer, yet the authors merely sketch the Kjeldahl process in twelve lines, and give no idea of the degree of accuracy which is ordinarily attained by it (or, in other words, the deviation of the results of different analyses of the same sample). As a fact, chemists who have had considerable experience in the estimation of nitrogen in solid fuel are frequently mistrustful of the Kjeldahl process—at least, as it is commonly carried out.

The greater part of the book by Messrs. Coste and Andrews treats of solid fuels and the apparatus used in their examination. The calorimetry of gaseous fuel has been dealt with by Mr. Coste in an earlier work, and is only lightly touched upon in this one. There are some 30 pages on liquid fuel, which seems little in comparison with nearly 20 pages devoted solely to the determination

* "The Examination and Thermal Value of Fuel: Gaseous, Liquid, and Solid." By J. H. Coste, F.I.C., Member of Council of the Society of Chemical Industry and of the Society of Public Analysts, Chemist in the Public Health Department of London County Council, and E. R. Andrews, F.I.C., Senior Assistant in the Chemical Laboratory of the London County Council. London: Charles Griffin and Co., Limited; 1914.

of moisture in coal and appliances for drying coal. Thermometers are dealt with very exhaustively in 25 pages, in addition to six pages on the history of thermometry. The treatment of these matters by the authors is very good, though many readers would have preferred it to be more concise. The index is inadequate. There is, for instance, no heading "nitrogen," and it was only by reading diligently that we found the meagre account already mentioned of the Kjeldahl method of estimating nitrogen in coal.

Subject to the reservation made in our opening remarks, we can recommend this text-book to analysts who have to examine coal and oil from the standpoint of fuels. The subject is not treated from the point of view of the engineer who has to use these fuels, nor, of course, does it lie within the scope of the book to deal with coal and oil as gas-making materials. Nevertheless, the work will be of considerable utility for reference in many gas-works' laboratories.

GAS COOKING IN LARGE ESTABLISHMENTS.

An Interesting French "Brochure."

UNDER the title of "Le Gaz pour la Cuisine," the well-known firm of MM. Lachomette and Villiers, of Lyons (whose Engineer is M. Godinet, a Past-President of the Société Technique du Gaz), have issued an exceedingly well-printed *brochure* for distribution in the numerous towns in which the supply of gas is in their hands. It contains about a dozen illustrations of large installations of gas-cooking appliances suitable for hotels, restaurants, hospitals, schools, religious establishments, &c., accompanied on alternate pages by concise observations on the value of gas as a time and money saver in culinary operations on an extensive scale. This is pictorially shown by three small sketches on the cover of the pamphlet. The gas-stove is started in a second by the application of a taper, whereas a coal-range takes twenty to thirty minutes with a certain amount of labour; while a 4 lb. chicken loses half-a-pound less in cooking by gaseous than by solid fuel. The appliances illustrated, which, we understand, are mostly of English manufacture, are in actual use, and are equal to meeting the requirements of from 30 to 300 persons; and it is stated that they are giving the greatest satisfaction. In addition to the establishments at which these appliances have been fitted up, a list is given of about forty hotels, restaurants, drapery establishments, &c., in Paris, Lyons, and other places, where gas is employed for culinary purposes. A useful feature of the *brochure* is a statement showing the quantity of gas generally required per head per day for cooking on a large scale; and it may be reproduced approximately as follows: Hospitals, barracks, convents, schools, &c., and medium-sized hotels and restaurants serving from 50 to 200 meals daily, 5½ to 7 cubic feet; larger hotels and restaurants, with a fine and varied *cuisine*, 5½ to 12½ cubic feet. The consumptions named include the gas required for heating water for the kitchen, pantry, &c., and for the preparation of the morning meals. The pamphlet is quite an artistic production; and, dealing as it does exclusively with cooking by gas in large establishments, we cannot call to mind anything resembling it among the gas-stove literature of this country. It is to be hoped that its distribution throughout France will be attended by numerous applications for similar installations to those of which particulars are furnished.

THE "HALF-WATT" ELECTRIC LAMP.

Smaller Units at Low Voltages—Reduced Prices for Old Sizes.

LAST week the Tungsten Lamp Association—which includes the makers of the Osram, Mazda, Wotan, Nitra, and Ediswan lamps—announced a reduction of prices, and the introduction of lower power units at voltages ranging from 50 to 65 and 100 to 130, which will necessitate these lamps being used in series on most public supply circuits, unless current-wasting transformers are employed. The diameter of the low-voltage 100-watt lamp bulb is "only" 4 inches, and the overall length 6¼ inches. That is the smallest unit; and it is described as of 200-candle power—the consumption being 100 watts. Four of these lamps would have to be used in series on ordinary voltages, unless transformers are introduced. The particulars are stated as follows:

Voltage.	Watts.	Approx. C.P.	Present Price.	Old Price.
50 to 65	100*	200	15s.	—
	200*	400	20s.	—
	300	600	25s.	30s.
	500	1000	30s.	35s.
100 to 130	200*	400	20s.	—
	300*	600	25s.	—
	500	1000	30s.	35s.
	1000	2000	40s.	50s.
	1500	3000	50s.	60s.
200 to 260	500*	1000	30s.	—
	1000	2000	40s.	50s.
	1500	3000	50s.	60s.

* New units.

NOTES FROM ABROAD.

Austro-Hungarian Gas Association.

We are informed by the Austro-Hungarian Association of Gas and Water Engineers that their President for the current year is Professor Dr. H. Strache, of Vienna. The Vice-Presidents are Herr I. Bernauer, of Budapest, and Herr F. Stibral, of Karlsbad. Herr A. Breisig and Herr W. Burckhard, both of Vienna, are respectively Hon. Secretary and Hon. Treasurer.

Gas for Balloons.

For filling the balloons taking part in a championship race on July 11, the Laclede Gas Light Company, of St. Louis, laid a special 12-inch main, 12,000 feet long, capable of supplying gas at the rate of 150,000 cubic feet per hour.

Royal Visit to the Munich Exhibition.

On the evening of July 13 King Ludwig of Bavaria paid his promised visit to the Munich Exhibition, "Das Gas," which is under his patronage. It will be remembered that he originally intended to perform the opening ceremony in person, but was prevented at the last moment by the tragedy in the Austrian Royal House. On the occasion of his visit, King Ludwig showed his usual interest in technical matters and engineering by a critical review, lasting two hours, of the exhibits. He evinced great interest in the modern processes of gas manufacture and application, and by his appreciation gave great satisfaction to all concerned.

German Illuminating Engineering Society.

The current number of the "Journal für Gasbeleuchtung" contains the programme of the forthcoming second annual general meeting of the German Illuminating Engineering Society, which is signed by the President, Herr E. Warburg. It is to be held on Saturday, Sept. 19, in Nürnberg, and besides the report of the General Committee and the Special Committees, and the transaction of the ordinary business, Professor Martens will lecture on "The Measurement of Light," and Herr Bechstein on the "Influence of Shades and Reflectors in Photometry." Visitors will be welcome. On the following day there will be an excursion to Rothenburg.

Refractories Committee in U.S.A.

A second meeting was held on May 28, at Pittsburgh, of the Joint Committee on Refractories, which is composed of representatives of the Refractory Materials Committee of the American Gas Institute, the Refractory Manufacturers' Association, and the Bureau of Standards of the Pittsburgh Testing Laboratories. The time was spent chiefly in dividing up the work; and Committees were appointed on "Clay" and "Silica." At the third meeting, held in Atlantic City on July 2, the Silica Section made a report, and both the Silica and Clay Sections have promised reports for the next meeting, due to be held in Chicago on Aug. 7.

Co-Partnership in U.S.A.

The Pacific Gas and Electric Company has recently issued a large amount of first preferred 6 per cent. stock. It is of interest in this connection to note, as pointed out by "The Times," that a large quantity of this has been subscribed for by employees of the Company, who receive the same favourable terms as other stockholders. It is estimated that some 1330 employees—nearly 40 per cent. of the Company's permanent staff—have between them taken £90,640 at par value.

Washing Gas-Works Smoke.

Among other improvements which are being made by the Utah Gas and Coke Company, of Salt Lake City, is the installation of apparatus for washing and cleansing the smoke from the retorts and furnaces. By forcing it through heavy sprays of water, it is relieved of solid matter and becomes almost invisible and innocuous. The Company, which is a prosperous concern and continually on the increase, has in use at present 139 miles of mains, and employs 255 men.

Anxious for Gas Supply.

The town of Cordele, Georgia, U.S.A., is evidently determined to have a gas supply, for, after granting five franchises which have all gone by default in the last two years, yet another has been granted to the American Gas Utilities Company, of Atlanta. This time the City Council has endeavoured to safeguard itself by exacting a deposit of $50 as a guarantee to start on the plant within six months. A curious condition is that when work is started the Company will deposit $5000 as insurance to the city against damage to life or property during the work of construction.

Electrolysis of Pipes.

The Bureau of Standards, Washington, has issued a report on investigations made on the subject of the surface insulation of pipes as a means of preventing damage by stray electric currents. None of the insulating materials generally in use, it is said, can be relied upon for more than temporary efficiency. Paints, pitch, and asphalt dips, pitch and paper, asphalt and felt wrappings, were all tested, but were rarely found to be effective for more than a year, and often no longer than four months. Paints lasted for an average period of 116 days, wrappings somewhat longer, though never much more than 400 days. The failure of the coatings is attributed mainly to the penetration of water, which, when it once reaches the pipes, enables a rapid destructive action to set in.

COKE BREEZE FOR BOILER-STOKING.

Tests of the Travelling Grate Stoker.

It may be in the recollection of our readers that some time ago a Committee was formed, with offices in Paris, for developing the use of coke; and some results of their labours were noticed in the report of the proceedings at the recent congress of the Société Technique du Gaz which appeared in the "Journal" for the 23rd ult. Among other efforts of the Committee in the direction indicated was an endeavour to find a suitable mechanical grate with which coke, particularly small, could be utilized for steam-raising purposes. This they succeeded in doing; the appliance being the continuous travelling grate of the Underfeed Stoker Company, Limited, of Coventry House, South Place, E.C. As the result of a deputation sent to England to investigate the merit of this grate, it was adopted by the Lyons Gas Company for their new central electricity station at La Mouche. The satisfaction it has given is shown by the fact that thirty-two of these stokers are now in operation in the Company's works; and we understand that an additional eight have recently been supplied to them. The stokers are also in use at the Rheims and Vichy Gas-Works; and in all the installations coke breeze has been very satisfactorily burnt upon them. The extent of the Lyons installation will be appreciated from the accompanying illustrations.

It is not to be supposed that the Company would have increased the number of these stokers if they had not been thoroughly convinced of their efficiency. It will be of interest, therefore, to give the results of a test by M. Bourdet of a Niclausse water-tube boiler at La Mouche; the fuel used being coke breeze alone, and the duration of the test 2 hrs. 1·40 min.

Dimensions—	
Grate surface	104·6 sq. ft.
Water-heating surface	2422·0 ,,
Heating surface of superheater	842·0 ,,
,, ,, economizer	701·0 ,,
Pressure—	
Steam-gauge	199·12 lbs.
Absolute steam	213·82 ,,
Pitot gauge air supply, under grate	1·133 in. water.
Temperature—	
Gases leaving boiler	736·00° Fahr.
,, ,, economizer	435·20° ,,
Feed water entering economizer	76·55° ,,
,, ,, ,, boiler	251·30° ,,
Steam	571·00° ,,
Superheat	184·50° ,,
Fuel—	
Total coke consumed	4440·00 lbs.
Moisture in coke	6 63 p.ct.
Dry coke consumed	4146·00 lbs.
Total refuse, dry	540 00 ,,
,, ,, ,,	13 02 p.ct.
Fuel per hour—	
Coke as fired	2189·00 lbs.
,, per square foot of grate	20·90 ,,
Dry coke	2046·00 ,,
,, per square foot of grate	19·50 ,,
CO_2 in gases leaving boiler	15·74 p.ct.
Total weight of water used	31,525 lbs.
Water used per hour	15,547 ,,
Apparent economic evaporation—	
Per pound of fuel as fired	7·09 lbs.
,, ,, dry	7·60 ,,
Efficiency	78·13 p.ct.

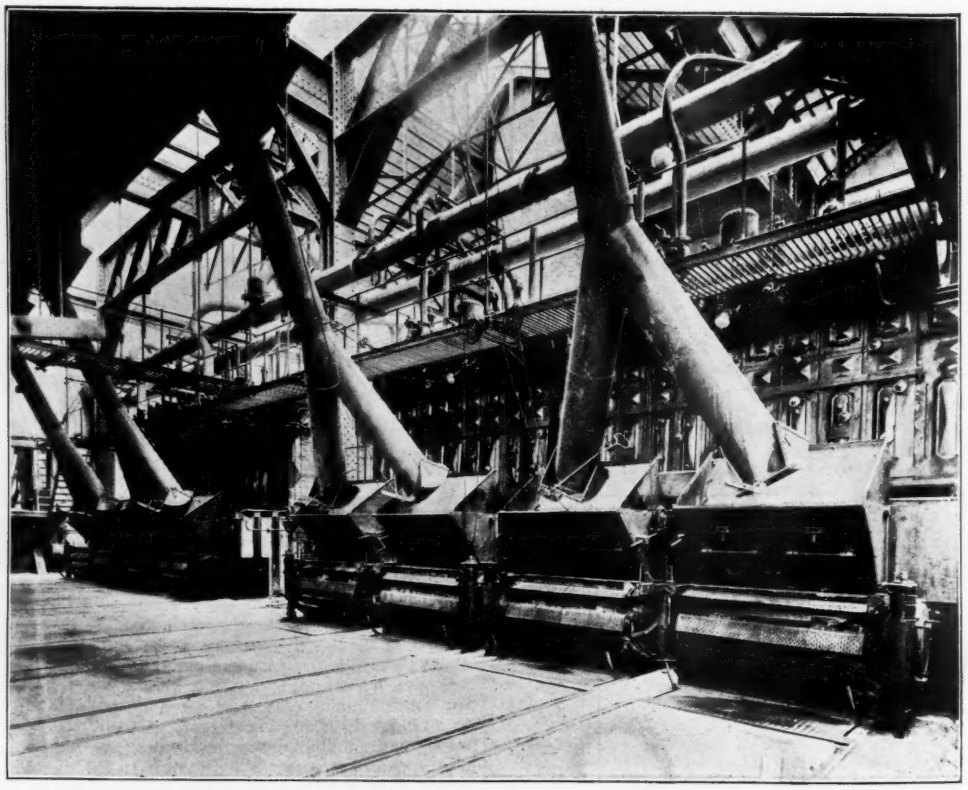
The good opinion formed of the stoker by the Coke Committee was fully confirmed by some comparative trials of one, fitted to a semi-tubular boiler, carried out by their technical staff at the Sommier Refinery, in Paris, by permission of M. Boivin, the Managing-Director. The surface of the grate was 3·31 square metres (35·63 square feet); and the ratio of the total heating surface to the grate surface was 75·3 per cent. The idea of the Committee was to utilize a fuel which was well within the reach of every manufacturer, and which would fulfil all the conditions required for the good working of the grate. They accordingly selected coke which would pass 0·5-inch and 1·5-inch screens; that is to say, a mixture of two classes of coke—small (0·5 in. by 1·5 in.) and No. 0 (0·8 in. by 1·5 in.). As there was no time to give the stoker any instruction in the use of coke, the results of the trials may, the Committee submit, be regarded as minima. They are specially interesting as showing what can be done by a stoker unaccustomed to the fuel he is using, and with normal working. Bringing all the elements of comparison to the same unit, the results of the trials may be summarized as follows:

	Small Coke.	Coke No. 0.
Net thermic yield of the boiler	69·02 p. ct.	70·5 p.ct.
Net weight of steam produced per kilogramme of raw fuel	6·78 kilos.	7·16 kilos.

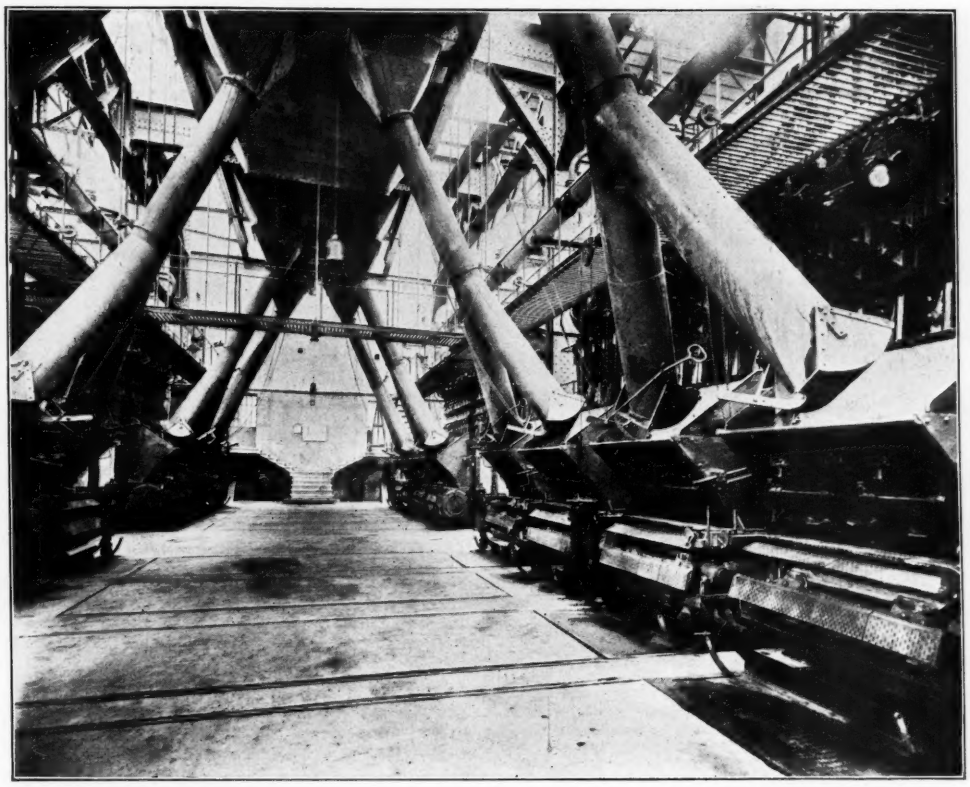
As will be seen, these results are satisfactory and very interesting. Although the grate under trial had not been intended for working with coke, the figures show that when of the small size named this is an excellent fuel, possessing qualities which justify its use for heating boilers by the aid of travelling grates.

A striking fact, which was recognized in the course of the trials, was the facility with which one fuel could be substituted for another, without any stoppage, and without causing any marked fluctuation in pressure. It was possible to change from stoking by coal to stoking by coke, or conversely, without the slightest difficulty. The fires remained clear and in good condition; the only precaution taken being to vary the height of the distributor. The Committee came to the conclusion that the grate possessed the valuable quality of lending itself readily to a change of fuel. Another point to which attention may be called was the absence of clinker; all the ashes being only agglomerations of quite small dimensions.

The results just given refer to the entire installation—boiler and grate. But the Committee considered that it would be very



PART OF THE STOKER INSTALLATION AT THE GAS-WORKS (USINES DE LA MOUCHE), LYONS.



HALF OF THE BOILER HOUSE AND STOKERS AT THE LYONS GAS-WORKS.

interesting to determine for the grate alone what would be the effect of using coke. With this object they carried out a series of trials with coke of two sizes—0·5 in. by 0·8 in. and 0·8 in. by 1·5 in.—and with unscreened coal. The two latter trials were made simultaneously with others for vaporization and thermic yield. The Committee gave the following definition of the yield of a grate: "The absolute loss of a grate is the ratio of the weight of pure fuel found by analysis in the waste to that of the pure fuel put upon the grate. The absolute yield is the ratio of the weight of pure fuel effectively burnt to that of the pure fuel effectively charged." The following are the epitomized results of the trials:

Fuel used	Small Coke.	Coke No. 0.	Unscreened Coal.
Duration of trial	7 hours	8 hours	8 hours
Weight of moist fuel burnt	1871·9 kilos.	1831·0 kilos.	1732·5 kilos.
,, dry ash and clinker produced	340·0 ,,	283·5 ,,	258·1 ,,
Loss of pure fuel due to the grate	121·7 ,,	104·9 ,,	109·2 ,,
Pure fuel charged upon the grate	1461·0 ,,	1528·8 ,,	1549·0 ,,
Weight of fuel burnt per square metre of grate per hour	80·7 ,,	69·1 ,,	65·4 ,,
Absolute loss	8·3 p.c.	6·8 p.c.	7·05 p.c.
Absolute yield	91·7 ,,	93·2 ,,	92·95 ,,

The Committee considered that, in view of the fact that they were dealing with a continuous mechanical grate, the absolute yields for the three fuels were satisfactory. Their trials were carried out upon a grate which was originally intended for coal, and in no way arranged for utilizing coke; and they lead to this very important conclusion—that, even when intended for dealing with coal, the travelling grate stoker, as already pointed out, lends itself perfectly well to the replacement of this fuel by coke, and ensures an equally good utilization of the material.

It only remains to say that these stokers are automatic, inasmuch as they not only feed the fuel into the furnace, but also return the ashes to the front and discharge them into hoppers under the boiler-room floor and beneath the fuel hoppers, as is shown in the illustrations. The fuel is handled mechanically; but what is of almost equal importance is that where the quantity of ash is high, it is disposed of with little or no labour. The merit of the appliance has been recognized by the award to the Underfeed Stoker Company, Limited, of several grand prizes and medals at exhibitions where it has been shown.

REFLECTIONS FROM "FIELD'S ANALYSIS."

By "Engineer."

In connection with an article under the above heading in the "Journal" for June 30, p. 1037, the writer gave a table of carbonizing results in which undertakings were placed in order of merit. The first column of Table A. allocated the positions with respect to the make of gas per ton; the results stated being taken direct from "Field," which allocation drew forth a protest from Mr. D. Irving ["see Correspondence," p. 111, issue July 14], who pointed out the unfairness of these figures when not associated with their respective illuminating values.

The writer did not wish to infer that a few hundred feet per ton of an inferior gas are worth more to the scientific carbonizer, nor yet to the consumer, but the figures were given in view of the interest taken of late years in big makes. From the consumers' point of view, of course, everything depends on the price at which he is getting the commodity. But the writer had no desire to pillory those undertakings which, through geographical position, accessibility, old plant, poor quality coal, &c., are occupying lowly positions in the table; and in a letter printed in last week's issue [p. 175], it was pointed out that, owing to the varying percentages of water gas, quality of water gas (amount of oil per 1000 cubic feet), and the amount of spirit used (if any), the ascertaining of the merit in the value of any result is rather more involved than a mere calculation of gross multiple, or the reduction of all makes to a common standard of illuminating value.

The table [p. 220] is an attempt to bring all makes to a common basis; and imperfect though it may be, it has the merit of being more representative than the mere makes per ton, or than the gross multiple. The contribution is offered in this spirit, and without any claim that the figures are quite correct.

A very few words of explanation will suffice. In the first four columns the gas made per ton, the candle power of the gas supplied to consumers, the gallons of oil per 1000 cubic feet of water gas, and the percentage of such gas made are all taken direct from "Field," and are here repeated in order to make the remainder of the table intelligible.

The next column gives the probable candle power of the oil gas made under normal conditions, from information gathered from various sources. It is well known that when a proportion of richer oil gas is mixed with coal gas, the arithmetical mean illuminating value is not obtained—the mixture resulting in a slight loss, increasing as the richness of the water gas increases, and also increasing to a smaller extent as the proportion of oil gas used gets larger. From various statistics, the probable illuminating value of the "straight" coal gas is tabulated, based on the above principles. In the cases of Brentford, Birmingham, Bolton, and Bradford, adjustments are made for the burner in use; and in the cases of Birmingham, Manchester, Nottingham, Brighton, Bristol, and Derby, deductions are made for the spirit used for the enrichment of the gas. After these adjustments have been made, the probable corrected values of the coal gas are tabulated in column six.

Column seven gives the gross multiple based on the make per ton and the corrected candle power; the succeeding column giving the positions in order of merit. Column nine gives for comparison

Undertaking.	Make per Ton. Cubic Feet	Candle Power Supplied.	Oil Used per 1000 Cubic Feet.	Percentage Oil Gas Made.	Probable C.P. of Oil Gas.	Probable C.P. of Coal Gas Corrected.	Corrected Gross Multiple. Thousands.	Position.	Original Position Make per Ton.	Price of Coal per Ton.	Candle Feet for One Penny.	Position.
			Gallons.							s. d.		
Gas Light and Coke	12,261	14·35	2·30	18	17·3	14·10	172·5	29	10	—	476	26
Commercial	13,472	14·61	2·26	32	17·0	14·00	188·5	14	1	—	513	23
South Metropolitan	12,522	15·51	—	—	—	15·51	194·5	10	9	16 2	582	17
Brentford	12,015	*a*15·18	2·26	37	17·0	17·45	210·0	2	15	—	584	16
Croydon	12,881	14·40	2·42	19	18·0	14·05	181·0	24	4	—	473	27
Hornsey	13,000	15·24	2·42	21	18·0	15·00	195·0	9	3	—	446	30
Lea Bridge	12,848	15·67	2·47	51	18·4	14·25	183·0	21	5	—	413	32
Richmond	12,039	16·23	—	—	—	16·23	195·5	8	14	17 8	501	25
South Suburban	12,828	14·25	—	—	—	14·25	183·0	22	6	18 10	464	28
Tottenham	13,048	14·74	2·18	30	16·5	14·50	189·0	13	2	—	554	19
Wandsworth	12,632	14·40	2·03	8	15·3	14·35	182·0	23	8	17 6	539	21
Birmingham C.	11,902	*b*15·69	3·37	18	24·5	16·40	195·5	7	17	—	886	2
Bolton C	11,165	*a*17·52	—	—	—	18·90	211·0	1	22	12 3	646	13
Bradford C.	10,438	*b*17·00	—	—	—	18·30	191·0	11	31	11 6	790	5
Carlisle C	11,152	17·60	3·20	9	23 5	17·65	196·5	6	23	11 5	658	11
Leeds C.	11,105	16·60	2·29	3	17·1	16·65	185·0	17	25	10 9	650	12
Leicester C.	12,078	14·65	2·59	2	18 9	14·60	176·5	27	12	13 9	526	22
Manchester C	11,903	16·88	2·06	19	15·6	17·20	205·5	3	16	—	643	14
Nottingham C	11,274	17·00	3·03	2	22·5	16·65	188·0	16	20	10 0	567	18
Oldham C	12,228	18·08	2·40	10	17·9	16·50	201·5	5	11	13 1	807	3
Salford C	10,723	18·90	—	—	—	18·90	203·0	4	28	11 8	691	10
Edinburgh C	10,803	17·05	2·70	1	19·9	17·00	183·5	20	27	11 1	545	20
Glasgow C	10,424	18·05	—	—	—	18·05	188·0	15	32	11 4	796	4
Bath	10,473	17·40	2·68	19	19 8	17·55	183·8	19	30	—	733	7
Brighton	12,752	15·40	2 29	30	17·2	14·90	189·5	12	7	—	435	31
Bristol	10,240	18·15	2·92	12	21·7	17·95	184·0	18	33	—	752	6
Derby	11,218	15·52	—	—	—	15·52	174·5	28	21	12 0	619	15
Newcastle	11,112	16·30	2·47	1	18·4	16·25	180·5	25	24	12 6	692	9
Plymouth	11,788	14·23	2·33	44	17·5	13 00	153·0	32	18	—	700	8
Portsea Island	10,840	14·38	2·65	30	19·4	13·85	150·0	33	26	—	454	29
Rochester	10,478	16·50	3 04	41	22·7	14·85	155·6	31	29	—	504	24
Sheffield	11,468	15·68	—	—	—	15·68	179 5	26	19	11 2	1085	1
Dublin	12,067	14·50	2·97	28	22·2	13·20	159·0	30	13	—	363	33

Note.—All illuminating values are tested by the "Metropolitan" argand burner No. 2, except those marked (*a*), which are by the fifteen-hole argand, and (*b*), which are tested by the "London" argand burner.

the order followed in the previous article, based on makes per ton only.

In column ten are given all prices of coal per ton for concerns making 10 per cent. or less of water gas; the coal costs being obtained by deduction, taking oil and coke at current rates. These coal costs will be nearly accurate, as the prices for coke and oil would have to vary by an extraordinary amount before making a difference of a few pence per ton.

Returning to the consumers' aspect of these matters, the final two columns of the table concern the candle feet obtained for one penny and the position occupied by each undertaking. As within certain limits the illuminating value bears a certain ratio to the calorific value (and in any case increases or decreases with it), the figure is also a relative measure of the heat units obtainable for a penny from each undertaking. In calculating this figure the net gas rental is added to the meter rental. This is, in the writer's opinion, the fairest method, seeing that the receipts from meters vary from nothing to 2·25d. per 1000 cubic feet. In connection with this it is seen that the Sheffielder gets three times as much for his money as his fellow consumer in Dublin.

GAS ANALYSES BY FRACTIONAL DISTILLATION AT LOW TEMPERATURES.

In a paragraph which appeared in the "Journal" for Dec. 23, 1913 (p. 936), reference was made to some investigations carried out by Messrs. G. A. Burrell and Frank M. Seibert, of the United States Bureau of Mines, into the fractional distillation of gas at low temperatures. The experiments were described in a paper presented, by permission of the Director of the Bureau, at the spring meeting of the American Chemical Society this year; and their result was the separation of a sample of natural gas into the individual paraffin hydrocarbons present. As this had not previously been accomplished, it may be of interest to reproduce the paper practically in full. It appeared, with an illustration of the apparatus employed, in the "Chemical News" for the 3rd and 10th inst.

Introduction.

Natural gases may contain only methane as the combustible constituent, or may be mixtures that contain large quantities of the higher gaseous paraffins. In some samples the latter predominate. In addition, there may be vapours of the liquid paraffin hydrocarbons present, sometimes enough to warrant the installation of a plant for their extraction. The natural gas used in Pittsburgh (Pa.) is a complex mixture, and is typical of gas that is supplied to many cities to the extent of billions of cubic feet per annum. The exact composition of this gas is of importance to the Bureau of Mines, because it is used in testing explosives, safety lamps, electrical mining machinery, and other mining appliances. By the scheme shown herein it is also possible to determine more closely the quantity of the vapours of the liquid paraffins in a natural gas mixture than has been possible heretofore. Gases that contain enough of these vapours are compressed and cooled at many plants and the condensate sold as gasoline.

It is generally known that ordinary combustion gas analyses give but little indication regarding the individual hydrocarbons present in a natural gas mixture. Only the two predominating paraffins are shown. In the experiments reported herein, natural gas was first liquefield by means of liquid air, and the different paraffin hydrocarbons separated by properly adjusting temperatures and removing the various fractions with a mercury pump. These fractions were analyzed by the ordinary slow combustion methods. Advantage was taken of the work of MM. Lebeau and A. Damiens, who prepared various mixtures of the gaseous paraffins, liquefied them, and partially separated them.* This work is an advance over their work in that the separation was made into single constituents.

The important part of this paper, however, is the application of the work to the determination of the constituents of natural gas. Such a separation is possible because in the liquid condition the boiling-points of the gaseous paraffins are found rather widely separated. These boiling-points are as follows: Methane, − 160° C.; ethane, − 93° C.; propane, − 45° C.; N-butane, + 1° C., and *iso*-butane − 10° C. The two butanes were not separated. In order to finish the work with fractions large enough for accurate analyses, the experiment given herein was started with about 1½ litres (1531 c.c.) of gas. Other experiments were performed with various natural gases in which smaller quantities were used. The sample as analyzed by ordinary slow combustion methods contained the following constituents: Methane, 79·2 per cent.; ethane, 19·6 per cent.; and nitrogen, 1·2 per cent. There is also about 0·03 per cent. of carbon dioxide in the gas mixture. Carbon monoxide, hydrogen, and olefine hydrocarbons are not present.

First Series of Fractionations.

The experimental procedure follows: The entire sample was first liquefied by means of liquid air or liquid oxygen. With the gas in liquid condition, connection was made between it and the mercury pump of the apparatus, and as much gas removed as possible. This process divided the original quantity into two portions—a gaseous portion and a liquid residue. In other words, the vapour pressure of liquid ethane (boiling point − 93° C.) is so small at the temperature of liquid air that none could be detected in the distillate within the experimental error of making the analysis. It was found that when liquid air was used that had stood for some time, so that its boiling-point had risen to a point near to that of oxygen (− 183° C.) the methane and nitrogen were removed

* See "Comptes Rendus," Vol. CLVI., p. 325; and "Journal," Vol. CXXII., p. 105.

from the original mixture more quickly than when a newly-made liquid air was used. This was to be expected. The residue from this first fractionation was allowed to volatilize, was measured, and again liquefied at the temperature of liquid air. Connection was again made to the pump, and more methane removed. In other words, though the residue from the first fraction was treated in exactly the same manner as the original sample, more methane was obtained. Upon volatilizing the entire residue, however, and again liquefying, a rearrangement of the solution occurred, and chance for faster evaporation of this last methane portion was afforded. In no case could the last minute portions be recovered; so the attempts at complete recovery were stopped when it was found that only such a small proportion was being left behind as did not sensibly affect the results.

To this point the first series of fractionations had reached a stage where the larger portion of the methane had been removed by the first fractionation, and where the first residue had been volatilized, re-liquefied, and pumped to obtain another small portion of methane. The residue from the second liquefaction was treated again in the same identical manner, and more methane obtained. A further identical treatment resulted in no additional recovery of methane. No indication of methane was found in the ethane portion within the error of making the analysis.

The distillate obtained by the above scheme undoubtedly contained a trace of ethane, but so small that it could not be detected by analysis. The analysis of a portion of the total methane and nitrogen fraction follows:—

	Cubic Centimetres.		
Sample taken	30·10	..	30·20
O_2 added	95·20	..	99·30
Total volume	125·30	..	129·50
Volume after combustion	66·30	..	70·10
Contraction due to combustion	59·00	..	59·40
Volume after CO_2 absorption	36·80	..	40·50
CO_2 produced by combustion	29·50	..	29·60
Methane from contraction (*a*)	29·44	..	29·64
Methane from CO_2 (*a*)	29·59	..	29·67
Per cent. methane from contraction	97·80	..	98·20
Per cent. methane from CO_2	98·30	..	98·20
Average per cent. methane	98·10	..	98·20

(*a*) Corrected for the molecular volume of CO_2.

Second Series of Fractionations.

The next step in the process involved the separation of the ethane from the methane free residue. This necessitated the employment of a temperature such that practically all of the ethane could be separated from the still higher paraffins, propane, the butanes, &c. The temperature used could not be too low, or the ethane itself could not be separated, nor so high as to remove also all the propane. A natural gas condensate obtained from a natural-gas gasoline plant by subjecting natural gas (casing head gas) from an oil-well to a pressure of 250 lbs. per square inch, and then cooling it to ordinary temperature, proved excellent when cooled by liquid air for obtaining temperatures higher than the temperature of liquid air. This condensate is known in the natural-gas gasoline trade as "wild" gasoline. It contains large quantities of liquid propane and the butanes (especially the latter) as well as some of the ordinary gasoline constituents. the pentanes, hexanes, &c. Other substances tried for obtaining low temperatures, such as alcohol, ether, methyl and ethyl chloride, &c., jellied so much at low temperatures that they could not be used satisfactorily. The gas did not remain of uniform temperature from top to bottom.

In order to obtain a temperature of − 145° C., for instance, the condensate was placed in a Dewar flask and stirred with a test-tube into which liquid air was run until − 145° C. was reached. Upon removal of the liquid air, the condensate warmed-up very slowly—about 5° to 10° C. per hour; thereby affording sufficient time for the withdrawal of the vapour from the liquefaction bulb. In separating ethane from the methane free residue, the latter was first cooled to a temperature of − 145° C., and pumping started and continued until the temperature had risen to − 125° C. By this process there was obtained a distillate consisting of ethane and propane. In other words, some propane (boiling-point − 45° C.) is removed at − 125° C. as well as the ethane (boiling-point − 93° C.). The residue was then treated twice in the same manner; the final separation of the ethane being made at a temperature of − 155° to − 140° C. The temperature was purposely lowered to − 125° C. to obtain practically all the ethane as well as some propane, because it was found easier to separate the ethane from the part of the propane that came over than to attempt to pull off all the ethane from the original residue. All the ethane was obtained; there being only small quantities of propane remaining as a residue. The analysis of a portion of the total ethane was as follows (the figures being, as before, cubic centimetres):

	(1)		(2)
Sample taken	25·50	..	20·30
O_2 added	96·60	..	99·40
Total volume	122·10	..	119·70
Volume after combustion	58·30	..	69·20
Contraction due to combustion	63·80	..	50·50
Volume after CO_2 absorption	7·20	..	28·70
CO_2 produced from combustion	51·10	..	40·50

According to the equation $C_2H_6 + 3{\cdot}5\ O_2 = 2\ CO_2 + 3\ H_2O$, the contraction should be equal to the $CO_2 \times 1{\cdot}25$. In No. 1 analysis the contraction then becomes 51·1 c.c. × 1·25 = 63·87 c.c. This corresponds well with the contraction actually observed—63·80 c.c. In No. 2 analysis the contraction is equal to 40·50 c.c. × 1·25 = 50·62 c.c. The contraction actually observed is 50·50 c.c. In calculating the ethane from the carbon dioxide and contraction, use was made of equations that correct for the deviations of carbon dioxide and ethane from the ideal conditions as follows:

No. 1 Analyses.

$0{\cdot}990\ C_2H_6 + 3{\cdot}5\ O_2 = 1{\cdot}992\ CO_2 + 3\ H_2O.$
c.c. ethane = 0·396 × contraction = 25·26.
c.c. ethane = 0·497 × CO_2 = 25·39.

No. 2 Analyses.

$0{\cdot}990\ C_2H_6 + 3{\cdot}5\ O_2 = 1{\cdot}994\ CO_2 + 3\ H_2O.$
c.c. ethane = 0·397 × contraction = 20·05.
c.c. ethane = 0·496 × CO_2 = 20·09.

Third Series of Fractionations.

The final residue from the second series of fractionations then contained propane and higher paraffins. The ethane-free residue was next liquefied, and pumped at a temperature that started at − 125° C. and ended at − 110° C.; the object being to remove practically all the propane (boiling-point − 45°), and also some of the butanes (boiling-points + 1° C. and − 10° C.). The residue from this operation was again treated in the same manner to obtain any propane that remained behind. It was thought that if a temperature was used that would permit the distillation of an appreciable quantity of butane, practically all the propane should come over. The total distillate obtained in this manner was then liquefied, and pumped at a temperature ranging from − 135° C. to − 120°. There resulted a distillate that consisted of propane only In other words, propane can be separated from the butanes at a temperature between − 135° C. and − 120° C.

The analysis of a portion of the total propane fraction was as follows:

	(1)		(2)
Sample taken	12·60	..	13·30
O_2 added	93·80	..	97·20
Total volume	106·40	..	110·50
Volume after combustion	67·60	..	70·00
Contraction due to combustion	38·80	..	40·50
Volume after CO_2 absorption	28·50	..	29·70
Carbon dioxide produced from combustion	39·10	..	40·30

According to the equation $C_3H_8 + 5O_2 = CO_2 + 4H_2O$, the contraction − CO_2 = 0·0. In No. 1 analysis, 38·8 c.c. − 39·1 c.c. = − 0·3 c.c.; and in No. 2 analysis, 38·1 c.c. − 37·9 c.c. = 0·2 c.c. The propane was calculated from the following corrected equation:

$$0{\cdot}986\ C_3H_8 + 5O_2 = 2{\cdot}991\ CO_2 + 4H_2O.$$

Then, according to No. 1 analysis, the propane when calculated from the contraction is 0·329 × 38·80 = 12·76 c.c., and when calculated from the CO_2 is 0·329 × 39·10 = 12·86 c.c. According to No. 2 analysis, the propane when calculated from the contraction is 0·329 × 40·5 = 13·32 c.c., and when calculated from the CO_2 is 0·329 × 40·3 = 13·26 c.c. In the case of both analyses, the quantity of propane as calculated from the CO_2 and the contraction agree closely. The same procedure was followed in the case of the propane separation as in the case of the ethane and methane separations. Distillates and residues were liquefied and pumped until no propane could be obtained. The analysis of a portion of the final residue follows. This should consist of butane only, providing no vapours of the liquid paraffins are present.

	Cub. Cent.
Sample taken	9·30
O_2 added	100·00
Total volume	109·30
Volume after combustion	76·30
Contraction due to combustion	33·00
Volume after CO_2 absorption	39·30
CO_2 produced by combustion	37·00

From the equation $C_4H_{10} + 5O_2 = 4CO_2 + 5H_2O$, the contraction × 1·14 = CO_2. From the above analysis, 33·0 × 1·14 = 37·62 c.c.; 37·62 − 37·00 = 0·62 c.c. difference. The above analysis was calculated to butane only, and appears to be almost entirely this gas; but undoubtedly a very small proportion of the vapours of the liquid paraffins was contained in the mixture.

Vapour pressures obtained by means of a manometer attached to the pump furnished evidence which indicated when a separation had been accomplished. For instance, at the temperature of liquid air the vapour pressure of the hydrocarbon mixture was 22 mm. The vapour pressure was not that of methane at that temperature, because some nitrogen was present. The pressure persisted throughout the pumping around this value until near the end, when it suddenly dropped to 0·0 mm. Then the pumping was stopped, and the residue allowed to volatilize. It was again liquefied and pumping continued until no more distillate was obtained. Three liquefactions of the residues were usually necessary for the removal of all the methane.

When the methane and nitrogen free residue were liquefied for the removal of the ethane, the vapour pressure of the mixture was about 2 mm. at − 155°, and about 4 mm. at − 145°. When nearly all the ethane was removed, the pressure dropped off suddenly to 0·0 m.m. when the pumping was stopped. The residue was again liquefied, and treated in the same manner till all the ethane was removed. Three successive treatments of the residue were usually sufficient.

After the removal of the nitrogen, methane, and ethane from the mixture had been accomplished, it became necessary to

separate the propane from the butanes, &c. This was accomplished at − 130° C. to − 120° C. The vapour pressure at − 130° C. was about 0·5 mm., and about 1 mm. at − 125° C. The pressure dropped suddenly to 0·0 mm. after nearly all the propane had been removed. The residues were then treated as previously described until all the propane had been removed. The final residue consisted of the butanes and any vapours of the liquid hydrocarbons that were present.

STAGES OF THE PROCESS.

The original sample of the gas was constituted as follows:

	Cub. Cent.		Per Cent.
Nitrogen	23·8	..	1·6
Methane	1297·4	..	84·7
Ethane	144·5	..	9·4
Propane	46·1	..	3·0
Butane	19·2	..	1·3
Total	1531·0	..	100·0

The sample was first liquefied with liquid air, and a distillate of 1311·3 c.c. obtained by the mercury pump. A residue of 219·7 c.c. was left behind. Both the residue and the distillate were again treated at the temperature of liquid air. From the residue there was obtained 9·9 c.c. more methane, but no residue remained behind upon treating the distillate of 1311·3 c.c. The sum-total of 9·9 c.c. and 1311·3 c.c. represented practically all the methane and nitrogen in the sample. The distillate from the re-liquefaction of the residue contained no methane, as determined by a further treatment at the temperature of liquid air.

After the methane had been separated, there remained a residue of 209·8 c.c., consisting of ethane and higher paraffin hydrocarbons. This residue was cooled at temperatures ranging from −140° to − 125° C., and as much gas removed by the pump as possible. Ethane and some propane were obtained, 133·3 c.c.; and a residue of 76·5 c.c. remained behind. The distillate was then cooled to temperatures ranging from −150° to −135° C., and a distillate of 124·7 c.c. obtained, and a residue of 8·6 c.c. This residue was added to the 76·5 c.c. residue, and the total 85·1 c.c., cooled to −138° to −130° C. and pumped. The 34·8 c.c. distillate was added to the 124·7 c.c. distillate previously obtained, and all cooled at a temperature that did not rise above −135° C. There was obtained a distillate of 147·0 c.c. and a residue of 12·5 c.c. The 147·0 c.c. distillate was then cooled and pumped at a temperature not higher than −140° C. The distillate, 144·5 c.c., was found to be pure ethane. The residue from this last treatment, 2·5 c.c., was added to the rest of the methane and ethane free gas for the propane treatment. The separation of the propane and butane was carried on in a manner similar to the methane and ethane separations, except for the use of higher temperatures. Temperature measurements were made with two pentane thermometers. They agreed with each other, and gave for the melting-point of chloroform −62° C., of carbon disulphide −111° C., and the boiling-point of fresh liquid air −193° C. The true melting-point of chloroform is −63·7° C., and of carbon disulphide −111·6° C.

SUMMARY.

A method of separation of a natural gas into its paraffin hydrocarbons is shown. At a temperature of − 185° C. to −190° C. the methane can be removed. The separation of the ethane from the propane, butane, &c., is conducted at temperatures ranging from −150° C. to −140° C. The propane is separated from the butanes, &c., at temperatures ranging from −135° C. to −120° C. This method of separating a gaseous mixture into its constituents, while somewhat involved, is the only known method in the case of some hydrocarbons. It can be extended to the separation of other gaseous mixtures. The authors have separated other natural gases; but the example given is sufficient to describe the method.

UTILIZATION OF GAS IN VARNISH MAKING.

In one of the "Notes from Abroad" in the "JOURNAL" for the 24th of February last, reference was made to the use of gas in the varnish factory of Messrs. W. P. Fuller and Co., of South San Francisco. The subject of the utilization of gas in the process of making varnish was dealt with in a paper read by Mr. J. L. Meyfarth, the Industrial Fuel Engineer of the Denver (Col.) Gas and Electric Company, at the mid-year session of the American Commercial Gas Association. The following is an abstract of the paper, with an epitome of the discussion to which it gave rise, taken from the current "Bulletin" of the Association.

After a few interesting remarks on the history of varnish, the author proceeded to deal with the various classes of the material and its essential properties. He then described as follows the equipment necessary for its manufacture: The varnish-room in a factory consists of a number of fireplaces, chimneys for carrying off the fumes, and necessary equipment, such as kettles, thermometers, &c. The fireplaces are generally cylindrical depressions in the floor, from 12 to 18 inches deep, in the bottom of which are grates with an ash-pit underneath. These are placed in a long row with brick walls between them. There is usually for the entire battery of fires one chimney, which is constructed like a large hood over a cooking-range, to carry off the fumes from the cooking of copals. In Europe provision has been made for collecting the vapours given off; but this is not the general practice in America. The kettles used are 100 or 150 gallon copper vessels mounted on little trucks so that they can be easily pushed over the fire or pulled off, whichever is desired. When a batch of varnish is to be made, a sufficient amount of copal is placed in a kettle, a fire is prepared, and the truck pushed over it. Another kettle is filled with the proper amount of linseed oil and placed over another fire. When the copal is melted so that it becomes entirely fluid, and in the estimation of the varnish maker is in proper condition, the hot linseed oil is added, and the whole mass cooked together for a short time. It is then pulled from the fire, allowed to cool somewhat, and turpentine or some other volatile solvent is added. After this, straining and ageing takes place before the varnish is ready for the market.

Mr. Meyfarth said this did not concern the members of the Association, as it did not involve the use of gas. The point which did concern them was the fact that great care must be used in the cooking of varnish. If it was overheated, it would become thickened and spoilt; if cooked too slowly, it would probably be dark. For these reasons, a heat which could be regulated, as was the case with gas, was desirable. He then said:

I have read the statement that gas is superior for the reason that a more intense heat can be obtained than from coke, the copal cooked faster, and a superior product obtained. My experience, however, has not been such as would cause me to agree with this statement. The coke fires over which I have seen varnish cooked were as hot as could possibly be used in this work; therefore there is absolutely no desire on the part of the varnish maker for any hotter fire. If too hot a fire is used, the copal will be scorched and the product spoiled; so it is evident that there is a point beyond which it is impossible to go in the matter of quick melting. In the tests made in Denver in the M'Murtry varnish factory, we found that in the case of the hard Zanzibar copal, half-an-hour was as brief a time as was practicable in which to melt. A further 20 or 25 minutes were required in order to complete the process. With the softer copals, such as Manila or Kauri, the work could be done in 10 to 15 minutes less.

The amount of coke required to do this work we must of necessity to some extent estimate. For example, as half a ton of coke is burned per day of ten hours per fire, and the cost of this is $2.50, we must reasonably estimate that the cost of firing one for an hour would be 25c. Therefore the cost of cooking a batch of varnish would be 25c. It requires a blast-burner consuming 1000 cubic feet of 650 B.Th.U. gas per hour to perform the same work in the same time. Therefore if this gas costs 75c. per 1000 cubic feet, the expense of performing the work would be 75c. But, as is the case in all other applications of gas, when this work is finished the gas-burner could be shut off, and the expense stopped; while in the case of coke-fires it is necessary to keep them burning continuously all day, whether or not they are being used, so that they may be ready if occasion required.

A varnish maker needs an assistant to help in pouring the oil into the hot varnish. While the services of the assistant could not be entirely dispensed with because of the use of gas, still his time could be more profitably employed in other work round the factory when no firing had to be done; and therefore we can reasonably say that the use of gas saves considerable labour. Further, in varnish making there is always great danger of fire; and this danger is necessarily decreased by the use of a fuel that can be regulated as well as gas. These advantages appealed to our customers to such an extent that they have decided to replace four of their six coke-fires with gas; retaining the two to be used for continuous service, and using the gas for all their intermittent requirements.

From what has been said, I think it will be plain that there are possibilities in this field for the use of gas. How hard the business will be to get is, to a certain extent, dependent upon local conditions; but I believe the possibilities are sufficiently great, in every case where there is a varnish factory on the lines of the gas company, for conditions to be investigated with a view to supplanting part of or all the coke-fires by gas.

In the course of the discussion upon the paper, Mr. E. F. Davis (Brooklyn) said he had carried out two installations, and had used a No. 24 "Industrial" burner; and the temperature seemed to be about 700° Fahr. They had to work within 50° of the flash-point of the varnish. He believed the consumption of gas in the first 15 minutes was 500 cubic feet. Then the large burner and the centre burner were closed, making a consumption of about 250 cubic feet per hour for the next half hour. Then the little burner, consuming 50 cubic feet per hour, was left on. The making of varnish was done in an hour and fifteen minutes, or half-an-hour less than with hard coal. Mr. Max Rosenberg (New York) said he knew gas was being used in New York for the purpose under consideration. Mr. W. A. Ehlers (Baltimore) said there was in his city a small factory which had been recently equipped with gas, and the only competition they had was from the staves of the old barrels in which the resin came. There were several bad fires on this account. There were in use one 1500-lb. and one 2000-lb. kiln set on a round brick retort about 9 feet in diameter. He was advised to use refractory burners; and he installed three of medium and a similar number of large size. The installation worked satisfactorily, and the parties were well pleased. The Chairman (Mr. Loebell) said he was glad the discussion had taken place; and he expressed the hope that at the next convention members would bring their note-books and contribute additional information.

ANNUAL REPORT OF THE LIVESEY PROFESSOR.

THERE has been received from Mr. J. W. COBB, B.Sc., F.I.C., the Livesey Professor in the Department of Coal Gas and Fuel Industries (with Metallurgy) in the University of Leeds, a copy of the following report which he has recently made to the Chairman (Alderman C. F. Tetley, M.A.) and members of the Livesey Advisory Committee. As will be seen, it gives a general account of the work of the department for the session 1913-14.

Gentlemen,—I have the honour to present below my second annual report, as holder of the Livesey Chair, on the work of the Department of Coal Gas and Fuel Industries in the University of Leeds.

Students.—The entries for the session 1913-14 of full-time day students specially attached to the department numbered sixteen, as against ten for the session 1912-13, and seven for the session 1911-12. There are nine students entered for degrees in "Gas Engineering" (two for honours), and two for degrees in "Fuel and Metallurgy;" one for the diploma in "Gas Engineering," and one for the diploma in "Fuel and Metallurgy;" one for the associateship of the Institute of Chemistry, and two for unclassified courses. Besides the courses to students mentioned above, lectures on "Fuel and Metallurgy" have been given to all the first-year engineering students of the University (a class of 31), and special lectures open to outside students drawn from gas engineering and metallurgical industries.

Special Lectures.—The special lectures have been given in the second term on Tuesday evenings, instead of Saturday afternoons as has been the practice in previous years, and on Wednesday evenings (two lectures on each evening with an hour's interval), instead of one lecture on the Wednesday evening and one on the Thursday morning. This alteration in times was made for the convenience of students, and seems to have served its purpose.

A course of eighteen lectures on the "Manufacture of Coal Gas" was given by Dr. H. G. Colman, and 21 students attended the course.

A course of nine lectures on "Refractory Materials" was given by myself, and was attended by 17 students.

I may point out that these special lectures are all attended by our day students at some time during their degree or diploma courses, and, indeed, form a part of these courses.

The special lectures were well received, but, as indicated in the previous report, would undoubtedly be more useful to many of the students entering if their general and scientific knowledge was more considerable.

Special Laboratory Course.—On Wednesday evenings in the second term the laboratory was opened for practical work. Five students attended for general fuel, pyrometric, and metallurgical work; but the proposed tutorial course in methods of gas-works analysis met with so feeble a response that it was not given.

Research.—The Senate of the University re-elected Mr. H. Hollings to the Gas Research Fellowship in October, 1912, and the Council of the Institution of Gas Engineers approved the election. Mr. Hollings has continued the work commenced in the previous year at my suggestion and under my supervision; and the results have been reported to the Institution in the form of two papers read at the annual meeting of the Institution in June. These are:

"Thermal Phenomena in Carbonization," and
"The Influence of Red-Hot Coke and Radiant Heat on the Gaseous Products of Carbonization,"
both by
Harold Hollings (Gas Research Fellow) and
John W. Cobb (Livesey Professor).

The University has already shown its approval of the work done by Mr. Hollings in connection with these researches by nominating him to the Royal Commissioners for the 1851 Exhibition Scholarship. This valuable scholarship, for which only one nomination can be made by the University each year, is one of the chief scientific prizes in the University.

Ventilation Research.—The Council of the Institution last year approached the University with reference to the appointment of a Joint Committee of the Institution and the University on Research in Ventilation. The Joint Committee was formed, met, reported the desirability of such research, and received a grant from the Institution of Gas Engineers for carrying on the investigation. A Research Chemist (Mr. W. Harrison) was appointed in September, 1913, and has already done excellent work. The Committee have made a preliminary report to the Institution for publication. A special draught-proof building has been erected in which investigations can be made; and it is hoped to give more positive results than have been obtained previously.

Refractory Materials Research.—The University made a special grant for research on this subject. An electrical furnace has been installed, and is now part of our equipment for determining the melting-point of very refractory materials. Mr. H. J. Hodsman, my Assistant Lecturer and Demonstrator, and I, with the help of Mr. G. Dougill, a senior student, have continued work on the conductivity of refractory materials. The apparatus is made to take standard bricks, and can also be used for determination of the conductivity of jointing materials. Interesting results have been obtained.

In a less advanced stage is some work which we are doing on the expansion of refractory materials, although preliminary trials have been very satisfactory. The apparatus will allow test-pieces to be used 8 inches long and ¾ inch square in section, such as can be cut from refractory ware.

Mr. G. Dougill has completed, at any rate for the time being, work on the corrosion of iron pipes by the oxygen dissolved in water supplies; and the results were published in a paper read before the Society of Chemical Industry in January last, and printed in the "Journal of the Society of Chemical Industry" for April 30.

Mr. Dougill is carrying out for me some experiments on the conditions of corrosion of metal by products of combustion, particularly such as contain sulphur compounds.

Equipment.—The equipment of the laboratory has been increased by the purchase of a Holborn Kurlbaum optical pyrometer, a porosimeter, effusimeter, flash-point apparatus, platinum and silica apparatus, Parr calorimeter, millivoltmeter, and other electrical measuring instruments. A grant for special apparatus was made by the University. We are now so placed that very complete examination of the properties of refractory materials and bricks can be made. Such an examination is part of the course for every student.

Museum.—Additions have been made to the departmental museum by:—

Messrs. G. Blackwell and Sons	Refractory materials and bricks.
Farnley Iron Company. . .	Refractory materials, bricks, &c.
C. P. Finn, Esq.	Carbon growths from coke-oven arches.
Professor Goodman	Bearing metals.
Leeds Corporation Gas Department.	Samples of coke and retort carbon.
R. D. Littlefield, Esq. . . .	Ores of copper, silver, and zinc.
H. T. Wales, Esq.	Specimens of high grade Welsh anthracite.

Courses.—The new regulation which came into force this session enabling a student exceptionally prepared (as by works experience) in technical subjects to take a diploma in two years, has proved useful in allowing two holders of technological scholarships to enter for this diploma course. On the other hand, the four years' "sandwich" course for students serving an apprenticeship or its equivalent, which would enable works and university training to be obtained together, and lead up to a diploma, has not been taken up by any student.

Vacation Work.—The following firms have taken students during the long vacation into their works or laboratories—a great service to us:—

Messrs. Clayton and Sons.
Farnley Iron Company.
Monkbridge Iron Company.

Gas-Fire Testing.—In October, 1913, a letter was sent round to the members of the Livesey Advisory Committee, which I proposed, with their approval, to forward to the President of the Institution of Gas Engineers. The replies received were so favourable that the letter was forwarded. It was to the effect that, as Livesey Professor, I could not issue signed certificates of gas-fire tests for publication unless the conditions of testing were standardized by some Committee. A Committee has been appointed.

(Signed) JOHN W. COBB,
Livesey Professor.

TEXAS COALS AND LIGNITE FOR GAS MAKING.

IN the last number of the "JOURNAL" we dealt further with the report, on the fuels used in Texas, by Messrs. W. B. PHILLIPS and S. H. WORRELL, issued by the Bureau of Economic Geology and Technology of the University of Texas. The following additional particulars will complete the notice of the pamphlet.

DRY DISTILLATION OF TEXAS LIGNITES.

In order to study lignites with reference to the amount and quality of the gas and solid residue to be obtained from them by dry distillation, the authors selected 22 typical lignites from different parts of the State, and dealt with them by the method they had employed for the dry distillation of coals. The tabulated results show that the yield of gas per net ton of dry lignite varied from 5358 to 9755 cubic feet—the general average being 7591 cubic feet; and that the illuminating power of the gas was low, only two samples giving as much as 6-candle power, one of these giving 9·3-candle power. The calorific value per cubic foot varied from 425 to 580 B.Th.U.; the general average being 513 B.Th.U. A high yield of gas seemed to be accompanied by a tendency towards a lower heating value in the gas; but the differences were not especially noteworthy. In regard to the composition of the gas, the following averages were observed: Illuminants, 2·2; carbon monoxide, 14·4; hydrogen, 48·3; methane, 25·1.

The most noteworthy circumstance in connection with the

tabulated results is that from lignites of extreme variation in composition it is possible to secure, on an average, from 6800 to 7900 cubic feet of gas per net ton, and that this gas carried from 487 to 537 B.Th.U. per cubic foot. In heating power the gas compares favourably with ordinary coal gas at 600 B.Th.U. per cubic foot. Allowing that good gas coal costs $6 a ton, and yields 9000 cubic feet of 600 B.Th.U. gas, consumers would have 15 cubic feet (9000 B.Th.U.) for 1 c. Allowing that dry lignite costs $2 a ton, and yields 7500 cubic feet of 500 B.Th.U. gas, it would work out to 37·5 cubic feet (18,750 B.Th.U.) for 1 c. The raw material cost of coal gas for fuel purposes is twice as great as that of lignite gas.

The authors give a table showing the composition and yield of the residue left in the retort after the dry distillation of the lignites already referred to. A study of it furnishes the following information: The volatile combustible matter was not completely removed; the amount remaining in the residue varying from 4·05 to 8·07 per cent., with an average of 5·92 per cent. The fixed carbon ranged from 65·41 to 79·01 per cent., with an average of 72·94 per cent. With complete removal of the volatile combustible matter, the fixed carbon would vary from 69·15 to 84·33 per cent., with an average of 77·52 per cent. The ash varied from 14·40 to 29·18 per cent.; the average being 22·14 per cent. With complete removal of the volatile combustible matter, the ash would vary from 15·67 to 30·85 per cent.; the average being 22·48 per cent. The sulphur showed a marked increase over that in the dry lignite. Excluding two abnormally high results, the increase was from 1·22 to 2·37 times, with an average of 1·64. In two cases out of 21, the sulphur in the dry lignite was more than it was in the residue. For the most part the sulphur appeared to be as calcium sulphate (gypsum). The heat units per pound varied from 9561 to 12,566; the average being 11,312. As some of the volatile combustible matter would probably contain certain heat units, it is useless to calculate what the calorific power would be in the residue if this matter were entirely removed. It is, however, not probable that there would be any loss in such residue. The yield of solid residue varied from 50 to 67·5 per cent.; the average being 54·9 per cent. With complete removal of the volatile combustible matter, the yield would vary from 52·11 to 70·78 per cent.; the average being 58·35 per cent.

The authors say they may assume, for the moment, that in the ordinary practice of distilling lignites in a closed, or practically closed, retort the residue will contain about 6 per cent. of volatile combustible matter; that the yield of this residue, from dry lignite, will be about 55 per cent.; and that it will contain from 73 to 75 per cent. of fixed carbon. It is not likely that there will be any economy in completely removing the volatile combustible matter, for the purpose will be to discharge the retorts as soon as the heat units in the gas begin to show a markedly lower value. Just where this point may be depends upon a number of conditions which, for the most part, have not been ascertained. The yield and the nature of the volatile matter distilled from such substances as coal and lignite depend upon many factors, some of them of varying moment. The principal ones appear to be as follows: The size of the material; the amount of disposable hydrogen—*i.e.*, the hydrogen that is free to combine with carbon as a hydrocarbon; the rapidity with which the temperature is raised; the length of time during which a uniform temperature is maintained; the maximum temperature within the retort and within the coal itself; the size and temperature of the space into which the gas is conducted; the rapidity with which the gas is removed from the retort; and the depth of the bed of coal which is being distilled. In dealing with coal and lignite, the authors say that it must be remembered that they are substances which, under the influence of heat, are decomposable into a considerable number of compounds, and that the original compounds formed may react among themselves, and produce other, and perhaps more complicated, substances. With the chemico-physical side of this matter they have but little to do at present, their main purpose being to call attention to the fact that Texas lignites are capable of yielding, in a dry condition, 7500 cubic feet of gas per net ton, of a calorific value of 500 B.Th.U. per cubic foot.

The authors conclude this chapter of their report as follows: "Irrespective of the heating value of the solid residue from the retorts, we have in lignite gas a source of cheap and effective energy, whether this energy be used in mere heating effects or converted into electric power through the medium of gas-engines and generators. A plant consuming 100 tons of dry lignite a day would produce 750,000 cubic feet of gas which would contain 375 million B.Th.U., and leave 55 tons of solid residue containing 1100 million B.Th.U."

Natural Gas.

The authors take up the subject of the natural gas in Texas, and furnish the following information: During 1912 a total of 13 wells were drilled in Clay County, of which eight were gas-producers; the number of gas wells at the close of the year being 29. Though stray gas sands are occasionally struck at 1250 to 1500 feet, the best wells in this field range from 1550 to 1750 feet. The pressure varies from 600 to 742 lbs.—the highest original rock pressure of wells in this field. The average pressure on Jan. 1, 1912, was 659 lbs., and on Dec. 31, 1912, it was 626 lbs. One well in this field not in use in 1912 never fell below 730 lbs., and for five months stood at 740 lbs. A test of gas from a number of wells in the field (made by Worrell) shows 700 B.Th.U. per cubic foot.

The total quantity of gas produced from wells in Texas in 1912 amounted to 7,470,373,000 cubic feet, valued at $1,405,077, or an average price of 18·81 c. per 1000 cubic feet, as compared with 5,503,393,000 cubic feet, valued at $1,014,945, or an average price of 18·44 c. per 1000 cubic feet, in 1911. This is a gain in value of $390,132. The greater portion of the value for 1912 was received for gas supplied for domestic purposes, which aggregated $906,412, or nearly double the value of the gas consumed for manufacturing and power purposes, which was $498,665. Some gas is used in Texas for brick manufacture. For power purposes it is utilized in operating gas-engines and boilers at water-works, ice plants, cotton-gins, and also largely in field work. The total number of gas wells in Texas at the close of 1912 was 87, of which 24 were drilled in the year. The number of dry holes drilled was 23; and the number of gas wells abandoned was six. In any account of natural gas in Texas mention is to be made of the promising field of Crowther, in the north-east part of M'Mullen County, where the Boston and Texas Corporation has found excellent gas under good pressure. The authors show this gas to have the high heating value of 947 B.Th.U. per cubic foot.

According to statistics collected by the United States Geological Survey, the total quantity of natural gas produced in the United States in 1912 was 562,203,452,000 cubic feet, with an average value of 15·04 c. per 1000 cubic feet. West Virginia led with a production of 239,088,068,000 cubic feet; while Texas ranked ninth in production and total value. In the quantity of natural gas consumed, Pennsylvania easily leads all the other States; for in 1912 it used 173,656,003,000 cubic feet, valued at $26,486,302, or 15·25 c. per 1000 cubic feet. In Pennsylvania the greatest consumption was for industrial purposes; and the average value of the gas was 11·45 c. per 1000 cubic feet. For domestic purposes, the average value was 24·53 c.

No gasoline is made from natural gas in Texas. This industry came into prominence in 1911, when there were produced in the United States 7,426,839 gallons, valued at $531,704, or an average of 7·16 c. per gallon. In this year the natural gas used for the manufacture of gasoline was 2,475,697,263 cubic feet, valued at $176,961; the yield of gasoline per 1000 cubic feet of gas ranging from 2·68 to 3·56 gallons. Some kinds of natural gas yield from 8 to 10 gallons of gasoline per 1000 cubic feet. In 1912 the production of gasoline from natural gas rose to 12,081,179 gallons, valued at $1,157,476, or an average of 9·6 c. per gallon. The quantity of natural gas used was 4,687,796,329 cubic feet. As also in 1911, West Virginia was the largest producer of gasoline from natural gas; the other States, in order of rank, being Pennsylvania, Ohio, Oklahoma, and California. The authors think it might be possible to establish this industry in Texas, using natural gas or lignite gas; but the cost of investigations has prevented them from working in this direction.

Natural gas at 9 c. per 1000 cubic feet competes with lignite producer gas. There are two large establishments in the same immediate vicinity engaged in the same line of industry, and using about the same amount of power; one of them having natural gas, and the other lignite producer gas. The natural gas consumer formerly used lignite producer gas and changed to natural gas without, however, dismantling the producer plant.

GAS-COAL CONTRACTS.

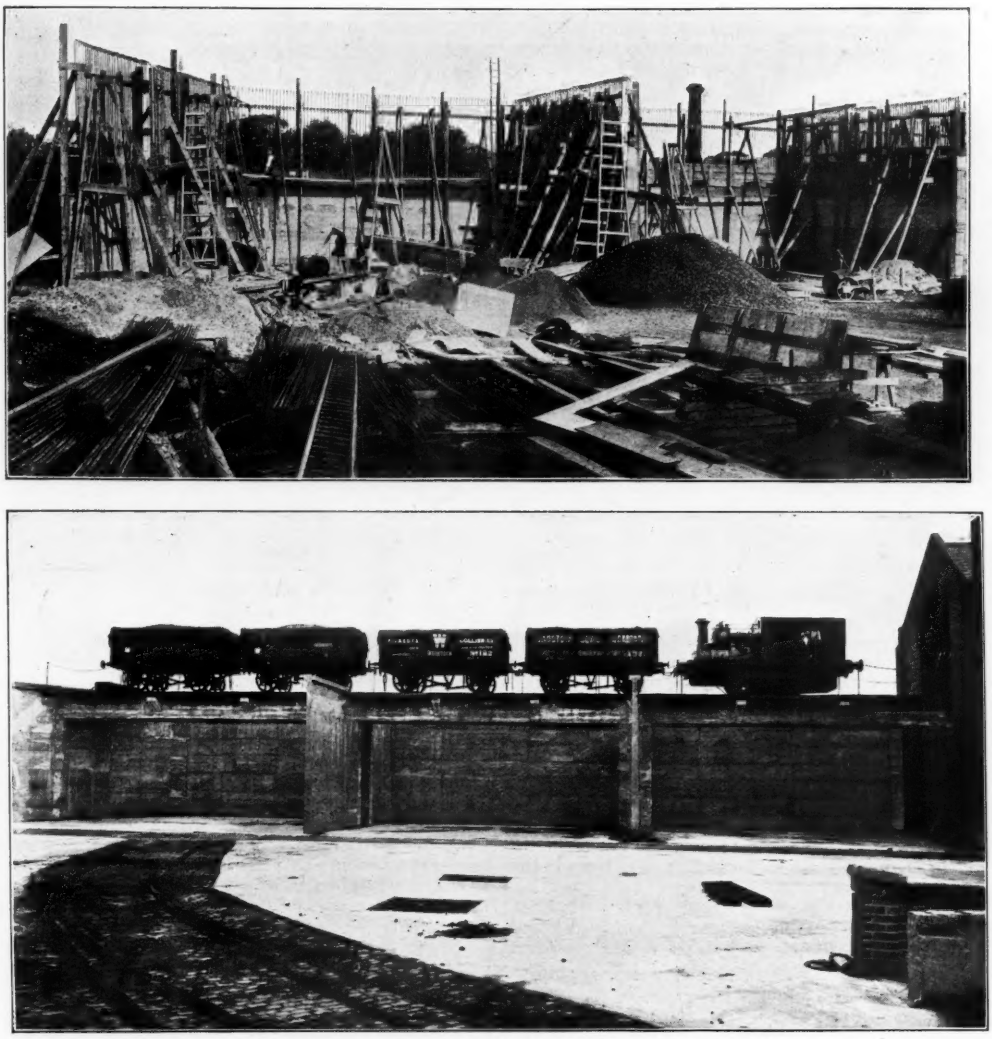
[Communicated.]

While a heavy tonnage of gas coal has been arranged on contracts, there still remain a considerable number to be negotiated. Usually this business has been concluded early in July; but this year, in view of the fact that collieries were mostly quoting the same prices for renewals when negotiations were first commenced (about the end of May), gas engineers have played a waiting game, with the result that substantial reductions have been secured—in spite of the reputed solidity of the Gas-Coal Owners' Association. For some time collieries outside the Association had been allowing reductions of 6d. and 1s. per ton, and had sold their outputs by the end of June. Following this the Associated Collieries have steadily been coming into line, and eventually they have conceded equal reductions. It will be remembered that for contracts arranged last year, prices were 3s. 6d. per ton higher in most cases than for those arranged from July, 1911-12; and in view of the obvious decline in trade, gas engineers considered they were entitled to a substantial reduction, which has materialized. The reductions obtained vary from 6d. per ton at small works, to 9d. up to 1s. 3d. at large works—according to the basis price. Against these reductions there will be a considerable fall in the value of residuals as compared with a year ago—gas coke being very weak. Some gas undertakings have only bought a very small proportion of their requirements at present, in anticipation of securing greater reductions than those named; but it would seem advisable to conclude their buying without much delay—especially in view of a lock-out being declared in Scotland which would immediately have an effect on productions in other coal-producing centres. Then, with the August Bank holiday over, there will be more business passing in house coals, which will strengthen the position of collieries.

[This contributor, it may be mentioned, does not hail from the Durham or Northumberland coalfield.—Ed. J.G.L.]

REINFORCED CONCRETE COAL-BUNKERS

Constructed at Aldershot.



The Reinforced Coal-Bunkers at the Aldershot Gas-Works.

WITHIN the last few years reinforced concrete on the Coignet system has found a large number of applications in gas-works; the principal advantage of this comparatively new method of construction over steel, timber, or brickwork being that the material does not deteriorate rapidly, and does not require any maintenance. The fact that reinforced concrete is not attacked by the fumes of sulphur and ammonia is also, in itself, a recommendation for the use of this form of construction in gas-works.

We are reproducing some views of coal-bunkers carrying an elevated railway recently constructed on the "Coignet System of Reinforced Concrete" at the Ash Road works of the Aldershot Gas, Water, and District Lighting Company, to the requirements of Mr. R. W. Edwards, the General Manager. As shown, the bunkers are composed of three compartments separated by vertical walls supporting reinforced concrete way-beams carrying a railroad and platform for the unloading of the coal. The reinforced concrete walls are 16 ft. 6 in. high, measured from the ground-level. Each bunker has a depth of 28 feet; and the way-beams are 35 feet in span. The thickness of the wall gradually decreases from 12 inches at the bottom to 6 inches at the top. Owing to the inconsistent nature of the ground, the footing on the walls had to be carried down to a distance of 4 ft. 6 in. below the level of the ground; and a bed of ordinary concrete several feet in thickness was provided to distribute the load on to a stratum of gravel. To avoid any vertical or horizontal beams or ribs, the walls are calculated as a cantilever slab, fixed into the ground by the footings, which have a width of 5 feet; so that the weight of the earth and coal resting upon the footings has the effect of preventing the wall from overturning under the action of the pressure of the coal.

If these bunkers had been constructed in brickwork, they would have undoubtedly required much heavier foundations and much thicker walls; so that not only would the cost have been greater but the capacity of the bunkers would have been considerably less than with the thin reinforced concrete walls. The actual dimensions of the bunkers will allow about 1500 tons of coal being stored. The maximum weight of the locomotive is 22 tons gross, with a wheel-base of only 5 feet. The work has also been calculated for ordinary railway coal-trucks, 16-ton gross, with a wheel-base of 9 feet; and it is anticipated that later on a crane fitted with a grab will come on to the way-beams. The surface of the ground has been concreted, and railway lines have been laid, with a turntable, in order to facilitate the manipulation of the coal.

Adjoining the coal-bunkers, a reinforced concrete boundary wall has also been erected, having a length of 118 feet, and a height of 9 feet above the ground level.

The plans for the reinforced concrete work were executed by Messrs. Edmond Coignet, Limited, of No. 20, Victoria Street, S.W., and the reinforcement was composed throughout of round steel bars. The bunker walls contain principal bars $\frac{5}{8}$ inch in diameter, and the secondary bars $\frac{1}{4}$ inch in diameter. The way-beams—the dimensions of which are 14 inches by 30 inches, contain six bars $1\frac{3}{8}$ inch at the top, and a similar number of the same diameter bars at the bottom; both groups of bars being connected with $\frac{3}{16}$ inch diameter stirrups, spaced gradually closer together towards the supports, so as to counteract the shear. The pillars supporting the ends of the way-beams contain twelve bars $\frac{3}{4}$ inch in diameter, bound together by means of ties $\frac{3}{16}$ inch in diameter.

A Naphthalene Locomotive.—His Majesty's Consul at Lyons states that the Schneider works at Le Creusot have constructed a naphthalene locomotive, driven by a water-cooled four-cylinder motor, capable of giving 70 H.P. at 950 revolutions per minute. The advantages claimed for the new type of internal-combustion engine are its cheapness of running and its independence of coal or water, except the small quantity required for cooling purposes. It has two carburettors—one working with ordinary petrol for starting; and the other, which is water-jacketed, for taking up the drive by means of vaporized naphthalene, previously melted in a reservoir.

NEW SHOW-ROOMS OF THE SWANSEA GASLIGHT COMPANY.

ENTRANCE TO THE SHOW-ROOMS OF THE SWANSEA GAS COMPANY.

THE progressive policy which is now prevailing in the gas industry of this country has once again been emphasized, this time in South Wales, by the opening of well-equipped centrally situated show-rooms by the Swansea Gas Light Company. Premises have been secured in one of the leading business thoroughfares of the town, and have been altered and decorated to suit the requirements of a modern gas show-room. The window front is in good taste, with an imposing double entrance, as will be seen from the photograph. A Keith and Blackman gas-compressor (gas-engine driven) has been fixed in the basement; the front of the premises being illuminated with three 1500-candle power lamps overhanging the footpath, and one 1000-candle power lamp in the entrance.

The central show-room has been decorated with imitation oak paper, and panelled and stained to an agreeable shade. A series of chimney-breasts has been built, to which are fixed different types of mantelpieces, with tiled surrounds, hearths, and curbs, and with suitable gas-fires fitted, and in use. A handsome show-case, 10 feet long, 3 ft. 6 in. wide, and 7 ft. 6 in. high, stands in the middle of the room. This case is provided with a mirror base and clear plate-glass top, with suitable lights above, for the efficient display of the shades contained in it. At the further end of the room a counter is provided for the convenience of consumers, many of whom it is expected will prefer to pay their accounts there rather than journey to the gas-works, as has been necessary in the past.

A model bath-room has been fitted up, in keeping with the general scheme. This also is a "live" exhibit. A bath with two geysers, a hand-basin with two suitable rapid water-heaters, and a towel-rail connected to a circulator in another room are the most attractive items.

There is a good cookery demonstration room, which has been

INTERIOR OF THE SHOW-ROOM.

arranged with a view to holding cooking demonstrations when desired. A platform 18 inches high is provided with a gas-cooker; and there are a gas-heated copper, sink, hot-water circulator, and the necessary storage tanks.

Then, again, a room has been provided to display appliances suitable for the many manufactures carried on in the vicinity. Muffles and furnaces of various descriptions are shown.

The numerous pendants in the central show-room are good exhibits, any of which may be readily lighted to show intending customers the effect of different globes or silk shades. Distance-lighting systems of various kinds are also to be seen in use.

The alterations to the premises and the fitting-up of these attractive show-rooms have been carried out under the personal supervision of Mr. Reginald G. Clarry, the Engineer, Manager, and Secretary of the Company, to whom we are indebted for the photographs and the particulars reproduced. Mr. W. H. Cattell, who was recently appointed to take charge of the show-room, was previously with the Birmingham Corporation Gas Department, under which he held a somewhat similar position at the Sutton Coldfield branch show-rooms.

FUTURE OF LONDON'S ELECTRICITY SUPPLY.

The County Council's Proposal.

A question that has been much talked about in electrical circles of late has been what were likely to be the proposals of the Special Committee appointed by the London County Council to consider the electricity supply of London; and the large interests—municipal and company—now engaged in the work of providing the supply of electricity to London have been speculating all round as to what the Committee would recommend following the report of the experts—Messrs. Merz and M'Lellan. The outcome has been just what might have been expected—that the Committee have adopted largely what Messrs. Merz and M'Lellan themselves considered to be the best part of their report. The Committee hope that the matter may be put forward, in concrete form, in the next parliamentary session. Conferences are being held with the municipalities and the companies concerned; and soon after the summer recess, it is hoped that the Committee will have a fully-matured scheme ready for adoption. There may be some doubt as to this.

The Proposal and a Conciliatory Move.

What the Committee have aimed at has been to initiate a new policy rather than make any revolutionary change in the *status quo*. And with the object of removing obstacles that stand in the way of further progress, they have thought it better to base the scheme upon an effort at co-operation with the existing undertakings *by agreement* rather than by arrangement involving competition with them. The Committee have an eye to the concentration of electricity production on favourable sites. But in the initial stages of any new undertaking, the fullest economical use is to be made of the existing undertakings so far as it is advantageous to do so. It is seen from this that no wholesale scrapping of plant is intended. In fact, it is an essential feature of the scheme that, so far as the existing undertakings are in a position to carry on the work of supplying for which they have been established on satisfactory and economical lines, they shall remain undisturbed, and that the option shall be given to them of taking additional power from another source, so avoiding further costly extension, when it is found that it is economical for them to do so, or, if they think it desirable to do so, to merge themselves in a new undertaking. The actual bringing forward of the scheme now outlined would, of course, depend upon the arrangements that could be made with certain of the local authorities and companies for the transfer of some of the existing undertakings at the beginning.

Technical Basis.

The Committee have adopted as the best to which to give gradual effect the technical conclusions of Messrs. Merz and M'Lellan.

(*a*) The concentration of generating plant on sites down the river is the correct policy to begin with, both on technical and commercial grounds, deferring the question of generating part of the energy at the coalfields or elsewhere until both the load and the load-factor have grown.

(*b*) In order to carry out this policy with the minimum waste of capital, a high voltage three-phase primary distribution system at fifty cycles per second should be standardized for London as soon as possible. In this connection, a standard primary voltage should be at once adopted for all new high-pressure mains.

(*c*) If electricity is to be supplied for power and general domestic use at the lowest possible price, it is also necessary, both for economical and other reasons, that existing low-pressure distribution networks should, as a rule, not be extended, but be supplemented by a new three-phase network.

(*d*) The most satisfactory and economical method of achieving these results is the establishment of a new undertaking with such powers as will enable it gradually to concentrate production, standardize distribution, and bring about the amalgamation of all the various undertakings.

Gradual Absorption.

Therefore the Committee recommend that a new undertaking should be established which would gradually centralize production and unify the distribution of electricity in Greater London, and ultimately absorb all the existing undertakings in the area. Special attention has been given in the preparation of the scheme to the question of security of supply against breakdown, war, or industrial disturbances.

Area of Supply and the Responsibility Body.

To secure the most satisfactory form of supply for London, the Committee think that the area of the scheme should include the county of London, and such districts adjacent thereto as together form, from the geographical and engineering points of view, the most appropriate field of supply. Portions of five other counties and three county boroughs are suggested for inclusion; and it is proposed to associate the councils in such areas in responsibility —financial and otherwise—for the scheme. But the Committee look with disfavour upon a complex or unwieldy authority. They say:

> In this connection we have had our attention drawn to the fact that machinery is provided by section 81 of the Local Government Act, 1888, for setting up a body which might, with certain modifications, conveniently deal with the matter. The section in question provides that any county council or councils may, from time to time, join in appointing, out of their respective bodies, a joint committee for any purpose in respect of which they are jointly interested, and may delegate to such committee, from time to time, any power which such council or councils might exercise for the purpose for which the committee is appointed. There are certain limitations in this section upon the powers of any joint committee established thereunder, which would be inconsistent with the general tenor of the scheme which we submit; but we are inclined to the view that the line of least resistance would be secured by constituting an authority somewhat on the lines of such a committee, subject to the authority having the necessary increased statutory powers which would enable it to carry out the duties allotted to it under our proposals.

A Combination of Municipal Control and Private Operation—Finance.

The Committee discuss fully the question of control; and they think the machinery to be set up should provide for a combination of municipal control and private operation. As to the exact relations which should obtain in respect of such combination, the various courses that might be pursued are considered; but the one most favoured is this:

> An arrangement might be made under which the capital required should be provided in definite proportions by the authority and a company—the company to have possession of the whole undertaking (including any undertakings acquired) for a definite period, subject to full powers of control and supervision by the authority.

The suggestion is that the authority should advance, by way of loan, two-thirds of the capital required for fresh works; the remaining one-third of such capital would be found by the company. As regards the capital involved in the transfer of existing undertakings, it is suggested that the whole of the money required for this purpose should be provided by the authority. The whole undertaking, it is contemplated, should rest with the company during the period of contract, at the end of which the authority would resume possession. In this, therefore, complete ultimate ownership by the authority is contemplated—the company bridging over the intervening time, so relieving the authority of many disadvantages which would attach to immediate possession, partial or complete. In short, it is proposed that for a period the new undertaking shall be established and worked by a company to be constituted by Statute, subject to effective powers of control being exercised by the authority.

An Intermediate Technical Body.

The Committee realize the importance in such a far-reaching scheme of continuity of organization, management, and policy, once the broad lines are determined. For these reasons, the advantage is suggested of having an intermediate expert technical (engineering and financial) body, the members of which would be paid for their services, and act under the direction of the authority. The duties of such Committee would be:

(*a*) Generally to consider and report to the authority on all matters connected with the establishment and working of the new undertaking on which the decision of the authority is required, and in particular—

(i.) To approve designs, plans, and systems of generation, distribution, or supply, either for the purposes of the new or existing undertakings.

(ii.) To approve, from the technical point of view, all

arrangements for the purchase of existing electricity undertakings.

(iii.) To approve contracts by the Company for the purchase of materials, erection of buildings, purchase of sites, and other purposes.

(iv.) To approve contracts for the purchase or sale of energy in bulk.

(v.) To approve arrangements made by the Company for repairs and maintenance.

(*b*) To exercise, on behalf of the authority, such powers vested in the authority under the scheme as may be deemed desirable.

The Lines of Business.

Generally speaking, the foregoing may be taken to be the main features of the scheme; but the Committee then go on to deal, in their report, with matters of detail, such as powers to construct new works and operate undertakings, and then the powers of supply are dealt with. These, it is suggested, should include:

(*a*) The supply of electricity to authorized distributors; (*b*) the supply of electricity to consumers under the powers of any undertaking taken over; (*c*) the supply of electricity for railways and certain power purposes within the area, regard being had in respect of the latter to the existing powers of authorized distributors; (*d*) the supply of electricity for any purposes—(i.) in the district of an authorized distributor with the consent of such distributor, (ii.) in any district where no authorized distributor exists. There would be an obligation on the new undertaking to supply, subject to conditions.

Authority's Control over Operating Company.

The ideas of the Committee in regard to the powers of control on the part of the authority over the Company are as follows:

(1) Approval of all proposals by the Company involving capital expenditure.

(2) Approval of the nature of the capital raised by the Company and of the terms on which such capital is raised.

(3) Approval, during the last ten years of the contract, of all agreements and contracts entered into by the Company.

(4) A scale of maximum charges by the Company for energy supplied would be prescribed in the Bill. Such maximum prices to be revised by the Board of Trade from time to time upon the application of either the authority or the company. The rebate (if any) to consumers to be fixed yearly.

(5) Powers to take action for the protection of the interests of retail and bulk consumers.

(6) The general powers relating to electricity supply would be transferred to the authority, with certain necessary exceptions.

(7) An auditor to be appointed by the authority to audit each year, with an auditor appointed by the Company, the accounts of the Company.

Raising the Money, and Distribution of Profits—If Any.

The Committee next make proposals regarding the arrangements to govern generally the relations to be set up between the new undertaking and existing undertakings, with a view to securing as far as possible that degree of continuous operation and interworking which is so important from the point of view of any scheme of ultimate unification. In respect of finance, the following are the suggested arrangements, reproduced *in extenso*:

(1) The authority to be empowered to raise money for all or any of the purposes of the undertaking by the issue of electricity stock, or other means, upon the security of the new undertaking, and of the rates of the various districts represented or otherwise.

(2) Bodies represented on the authority to be empowered to accept financial responsibility for the London electricity stock, or other security or stock created for providing funds for the new undertaking, apart from those for which the company is responsible, and for defraying the costs of the authority so far as the same are not otherwise provided for.

(3) The company to be empowered to raise capital, and to raise temporary loans in connection with the working of the undertaking. The company would not have any power to charge the assets of the undertaking.

(4) The authority to be empowered to pay in electricity stock for stations, undertakings, and plant; and the company to be empowered to pay in shares for like purposes.

5) A sinking fund to be established, to be vested in the authority, upon the basis of the capital expenditure in connection with the undertaking being written off in the undermentioned periods—land and engineering works, 60 years; cables, 40 years; power stations and sub-stations, with all plant therein, 25 years; service lines, 12 years; interest paid out of capital, 30 years; and purchase of existing undertakings, 30 years.

(6) A reserve fund to be established, and the approval of the authority to be required to the arrangements with regard to the utilization thereof.

(7) Power to deal as follows with the net revenue from the undertaking—(i.) The payment of interest at an assumed rate of 4 per cent. per annum on the proportion of capital found by the authority. (ii.) The provision of a sinking fund, to be owned by the authority, at the rate of about 2 per cent. per annum on the whole of the capital of the undertaking. (iii.) The payment of interest on the capital found by the company, assumed at the rate of 4 per cent. per annum. (iv.) The formation of a reserve fund, calculated at ½ per cent. per annum on the whole of the capital of the undertaking. (v.) The surplus profits over and above the deductions for interest, sinking fund, and provision for reserve, already referred to, would be divided equally between the authority and the company, until the company receives a share sufficient to pay a further 4 per cent. interest upon its capital expenditure; making in all a return of 8 per cent. interest to the company. Any further profits would, as regards 75 per cent., be utilized in giving a rebate on the prices charged to consumers, and the remaining 25 per cent. would be divided equally between the authority and the company.

(8) The authority to be empowered to utilize the profits received from the undertaking in excess of the capital charges on the money raised for the purposes of the undertaking and the establishment expenses of the authority not otherwise provided for, the relief of rates in the areas represented on the authority, or for such other purposes connected with the undertaking as may be deemed desirable.

An Elastic Scheme and its Keynote.

It will be seen from the foregoing that the scheme differs from previous proposals in three important respects. It represents a combination of municipal and private enterprise designed to ensure full control by, and an adequate share of profits to, the public, with the flexibility and commercial enterprise of company management. As to the share of profits going to the public, this is a matter upon which opinions will differ; but as regards the greater flexibility of company management over municipal, it is something to have this point acknowledged by a Committee of the London County Council. The scheme also (this is the second point) involves the co-operation of the authorities in Outer London with the County Council; and in view of the importance of the outside area to a thoroughly satisfactory scheme of supply, this may be regarded as a very important point. Here, however, are the elements of a big opposition to the scheme. Then there is the third point—that no compulsory purchase of existing undertakings will be entailed, and interference with existing undertakings will be reduced to a minimum. The keynote of the whole proposal is an offer to the existing undertakings of a means of increasing the efficiency of their present undertakings; or, if they prefer it, an offer of a means of handing over their complete undertakings (upon terms to be agreed) to a central authority. Upon the scheme the Finance Committee of the Council are not inclined to comment, until they get it before them framed completely and in detail. Whether then the Council will agree with the view of the Special Committee as to the desirability of going forward on these lines is at the present time quite an open and an uncertain matter. But here we have the outline of the Committee's considered scheme.

Gas for Drying Casks.—It appears that brewers in Germany have found that drying casks by gas is better than drying them by hot air. The process is described as follows: When a cask has to be refilled, it is first washed out, and then has to be very thoroughly dried inside, after which a pitch spray is used to give it a new lining. In order that the new pitch may adhere to the old, the drying must be very thorough. This has hitherto been effected by hot air, introduced by pipes through the bunghole; but these pipes, being hot, damage the bunghole. In the new application, a gas-burner, consuming about 52½ cubic feet of gas per hour, is used instead of the hot-air supply.

Recent Wills.—The late Sir Joseph Wilson Swan, whose death was noticed in the "Journal" for the 2nd ult., left £58,344. He bequeathed his electric and laboratory apparatus and appliances to be presented to any person or institution or corporation his executors might select. Mr. Joseph Cliff, a Director of the Frodingham Iron and Steel Company, who died on the 9th ult., in his seventy-fourth year, left estate of the gross value of £233,206, of which £156,383 is net personalty. Deceased was a Deputy-Lieutenant, and a Justice of the Peace, and in 1901 was the High Sheriff of Lincolnshire. The late Mr. Alexander Allan, of Scarborough, who died rather suddenly last Easter Sunday, as the result of an operation, left estate of the net value of £5800. Mr. F. C. Andrews, the Chairman of the Bury St. Edmunds Gas Company, left £21,800.

Funeral of the late Mr. J. Horsley Palmer.—The funeral of the late Mr. J. Horsley Palmer, whose death, following closely upon the announcement of his retirement, was recorded in the last number of the "Journal," took place at Witley Church on Thursday afternoon. There were present, on behalf of the gas industry, Mr. Robert Tindall, one of the Directors of the Imperial Continental Gas Association, representing Mr. Palmer's colleagues on the Board, and Mr. Robert W. Wilson, the Secretary, as the representative of the staff both at home and abroad; while Mr. A. W. Brookes, of the British Gas Light Company, attended for the Board and staff of that Company. Among the many beautiful wreaths were three from the Association—from the Directors, the London staff, and the Continental staff—and one from the officers of the British Gas Company.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Poplar Borough Electricity Department Accounts.

SIR,—I have read with a considerable amount of interest your notice of my last annual report, and duly appreciate the remarks thereon, taking into consideration the source from which they emanate.

In my opinion, a criticism in your columns is more valuable than one of a similar nature in the Electrical Press; and I am sure, from the tone of your remarks, that you do not wish intentionally to place before your readers anything that is not in accordance with fact.

You state that you fail to see any depreciation account among the several accompanying the report; and I think that this is because electricity accounts are presented in a different form to other industrial enterprises.

On pp. 14 and 15, under "Capital Account," you will observe that the total expenditure amounted to £401,710, which has been reduced to £301,364. Of this deduction, £14,763 was on account of obsolete plant (and £374 accrued). Therefore £85,957 had been paid towards the acquisition of assets. This sum is equivalent to depreciation in a similar sense to an undertaking retaining original capital and creating a sinking fund for depreciation.

You also comment upon a "midget" balance of £944 as contingent reserve; but this very fund is one with which I am particularly gratified. As you are perhaps aware, an extensive breakdown of electrical plant causes serious expense, and it was proposed three years ago to insure against such contingencies. I found that the then cost of such insurance would amount to £800 per annum; and I recommended my Committee to lay aside half this amount in reserve—charging against the fund all costs of this nature. You will observe that, not only has the department saved £400 per annum, but we hold £944 in hand against any breakdown of this nature.

I might add that I consider critical notices in your columns, if of a reasonable nature, will do far more good than the acrimonious comments which appear from time to time in the columns of both gas and electricity journals. It is possible that the future holds out the prospect of an amicable understanding between both industries. Both are engaged in the public service of supplying power, light, and heat; and it is a question of the survival of the fittest. But the aim of both should be the economic distribution of the products of coal; and I am of the opinion that both can combine towards that end.

The problem is one of national importance, and the solution will be arrived at much sooner if approached by both sides in the spirit of friendly rivalry, rather than by uncompromising commercial warfare.

J. HORACE BOWDEN,
Electrical Engineer and Manager to the
Metropolitan Borough of Poplar.

Bromley-by-Bow, E., July 22, 1914.

Leighton Buzzard Gas Bill and the Price of Gas.

Attention has been called to the fact that in our report of Mr. Henry Woodall's evidence in connection with the above Bill (p. 1051 of the issue of June 30), it was stated that he said the price charged by the Leighton Buzzard Company was, with the exception of Hitchin, the lowest charged by any company in Bedfordshire, Buckinghamshire, Cambridgeshire, and Hertfordshire. This was not correct. The statement made by Mr. Woodall was to the effect that, for a company of its size, the price charged by Leighton Buzzard was lower than that charged by any company in the four counties referred to, excluding Hitchin.

REGISTER OF PATENTS.

Vertical Retorts.

TOOGOOD, H. J., and ROBERT DEMPSTER AND SONS, LIMITED, of Elland.

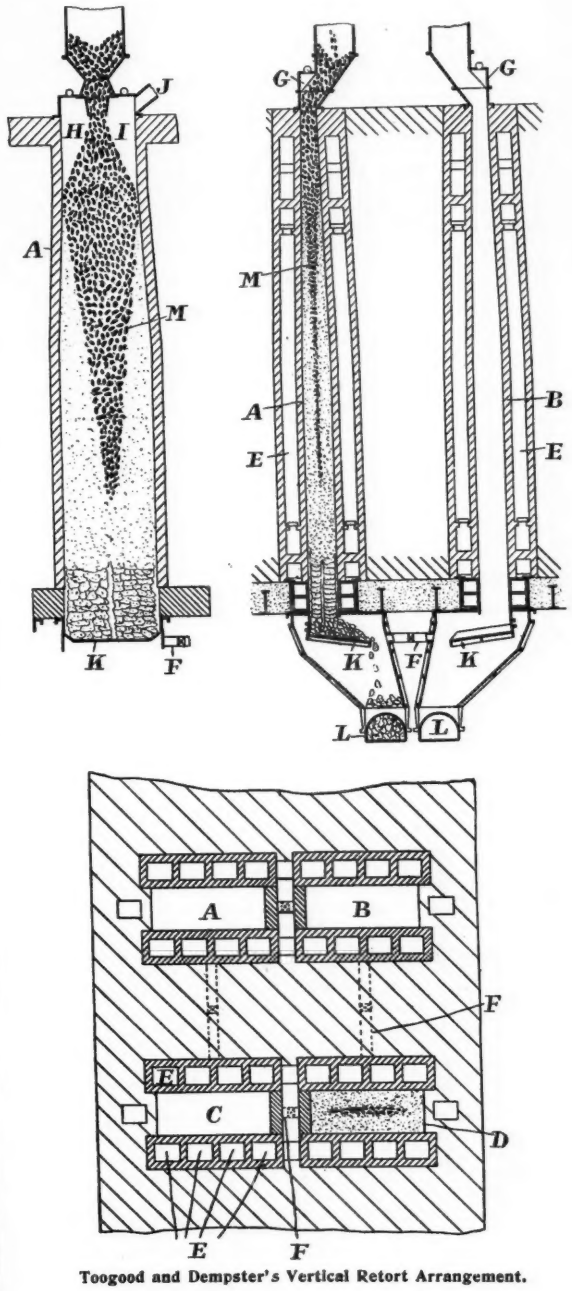
No. 9400; April 22, 1913.

In the course of their specification, the patentees remark: "In continuous carbonization in vertical retorts the coals on being heated swell. Consequently the cross-sections of the charge which contain coal expand, and by thrusting against the sides of the retort would adhere thereto and form an obstruction to the downward movement of the charge and the free upward passage of the gases evolved below, were it not for the gradual downward movement of the charge, which, by permitting the expanding cross-section to pass successively into larger cross-sections of the taper retort, gives accommodation for such expansion, and, in addition, provides the necessary free exit through the central core as well as at the sides for the upward flow of the products of distillation from below, by avoiding constriction of the central core due to the expansion of the surrounding coke being resisted by the sides of the retort, which would otherwise compel such expansion to take place inwardly and compress the core. This swelling tendency of the coal is aggravated by any obstruction to the free exit of evolved gases; hence the downward movement of the charge and the free exit of products of distillation are as one, and a necessity to the success of continuous carbonization.

"Realizing that the speed of this downward movement, though adjustable to suit different coals and heats, can have in practice but one fixed rate—namely, that corresponding to the rate of the proper carbonization of the particular coal in its traverse through the retort, in spite of fluctuating interference, such as varying taper due to carbon deposit, and the like—the importance of maintaining as uninterrupted as possible this downward movement will be apparent. The obvious remedies of increasing the taper, and providing a permanent gas offtake from the bottom of the retort, are found to be impracticable.

"The procedure within a heated retort can only be approximately inferred by deduction; but it is conceivable that, even though the necessary downward movement of the charge does take place, one of its cross-sections may, by fouling some deposit of carbon, be caused to tilt slightly in its downward movement—that is, sufficiently to obstruct the freeway for the gas—when in all cross-sections below containing coal the swelling tendencies would be aggravated, and so a slight coke might quickly develop."

The objects of the present invention are to prevent such interferences, and to furnish means to minimize their effect if they do occur, by providing bye-passes from the cooling chambers or coke receptacles at the lower ends of the retorts, which bye-passes communicate with any adjacent retorts, and thus the development of the choke can be arrested.



Toogood and Dempster's Vertical Retort Arrangement.

The illustrations show a retort in vertical section on its major diameter, a pair of retorts in vertical section on their minor diameters; and a sectional plan of four retorts. [See also illustration on p. 41 of the "JOURNAL" for Oct. 7, 1913.]

A, B, C, D are the retorts heated by flues E and connected by suitable bye-pass pipes F controlled by valves. The hopper which delivers coal centrally of the major cross-sectional diameter of each retort has a shoulder or projection G, the interior of which is free from the descending coal, and forms a cross passage whereby gas coming from the free space H can easily reach the free space I and ascension pipe J. Poke-holes with valves (of known type) are provided at each side of the coal inlet, "so that the stoker, in probing to ascertain the state of the charge, can probe on both sides of the coal inlet, and thus better maintain the aforesaid balanced condition, and one poke-hole above each retort is so placed that the stoker can poke directly down the central longitudinal axis of the retort, thereby opening a passage for the

gas through the portion of the charge having least resistance—that is, the central core of coal which is last carbonized—and also encouraging the subsequent splitting of the charge at the bottom of the retort." The extractor tray is indicated at K, and the self-sealing lid at L.

M represents the V of coal as it forms in the retort; the coal being held in an annular ring of tar, again surrounded by an annular ring of coke. "Consequently the rich gas from the coal rises chiefly through this V, the gases from the lower portion of the charge rising on each side of the V and leaving the charge symmetrically."

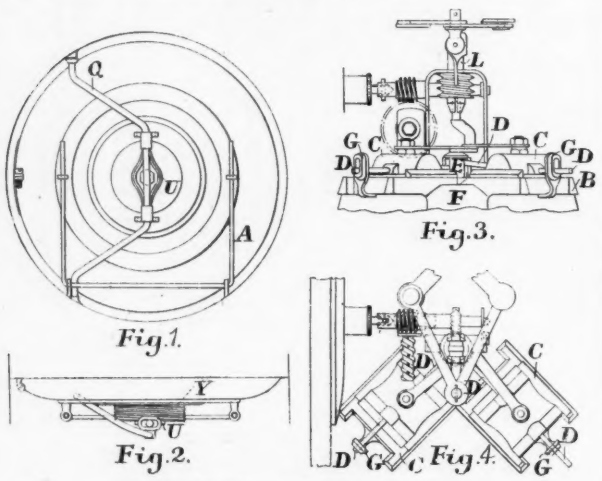
The patentees conclude their specification thus: It will be seen that if a temporarily excessive pressure of gas be found to exist in any one retort, this can be relieved by opening the bye-pass valves, and thus putting this retort in communication with either or both of the two adjacent retorts, which prevents the hanging up of the charge as described. Automatic dip-seals may, if desired, be used instead of the valves. We are aware that a bottom connection between one retort and another is not broadly new; and we make no general claim thereto under the present application. In our own previous specification, No. 28,201 of 1908, we described bottom cross connections between adjacent rows of intermittently operated retorts; these connections being closed during the charging and discharging of a retort, but open at other times—the charges in linked retorts being in different stages of carbonization. This, of course, would not apply to continuously charged retorts, each containing coal in all stages of carbonization. We are also aware that it has been proposed to connect the top outlet of a continuous retort, the lower end of which dips into water, to the interior of the lower part of the retort, for the purpose of conveying away from the bottom of the retort the surplus steam produced by the quenching of the coke, and incidentally the products of distillation. But according to our invention the connection is only made from the gas space at the bottom of a retort to the corresponding gas space or spaces of other retorts, and for other purposes as described.

Meters for Elastic Fluids.

PARKINSON AND W. & B. COWAN, and SCOTT, T., of Birmingham.

No. 14,343; June 20, 1913.

This invention relating to dry gas-meters consists in certain improvements in the bellows attachment and operating mechanism.



Scott's (Parkinson and Cowan) Dry Meters.

Figs 1 and 2 are an elevation and plan of the diaphragms according to the present invention; and figs. 3 and 4 show, in elevation and plan respectively, the assembly of certain of the parts employed.

The meter is preferably of the kind having circular diaphragms A and with a common valve seat B for the valves C controlling distribution to the diaphragm chambers. There is substituted for the usual flags and flag wires a cranked arm Q attached to a part U in connection with the diaphragm by means of slotted guides carried on the arm co-operating with pins moving with the diaphragm.

In order to be able to oil the inside of the diaphragms without removing them from the meter, two perforated metal discs are clamped at the centre—one on each side of the diaphragm. It has a projecting screw-threaded part Y closed by a screw metal cap to carry the two pins referred to above.

The valves are two in number, and have guide-rods D extending on both sides, so that they can be guided to move with rectilinear motion. To ensure this a dome or cap E is provided with two sets of oppositely cut slots F for co-operating with one guide-rod of each valve; the other guide-rods being guided in suitable slotted standards G.

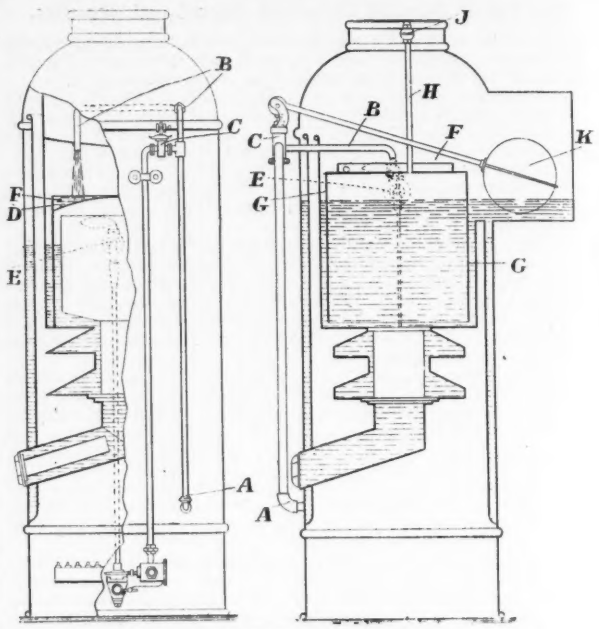
The top of the guiding dome has a depression H formed in it to receive the lower pivot of the crank driving the two valves. This crank is set into the split end of the worm shaft L for communicating motion to the valves. Thus the setting of the valves can readily be adjusted; and then, as there is sufficient friction between the split shaft and the crank shaft, the valves and shaft can be removed from the meter, and the crank soldered to the worm shaft without fear of altering the setting then or in any subsequent removal.

Gas Water-Heaters.

STOTT, V. H., and SCHOFIELD, L., of Oldham.

No. 14,492; June 23, 1913.

In water-heaters of the type in which the cold water supply is automatically controlled by the expansive properties of the boiling water actuating a float or bell, when gas is used as the heating medium, the movement of the float or bell—*i.e.*, its rising and falling motion—is, the patentees remark, somewhat slow, consequent on the circuitous passage made by the cold water in order to expose it as long as possible to the heating surfaces. "It thus follows that the cooling and heating effect underneath or about the float is equally slow; and this brings about an intermittent supply of water at the draw-off point."



Stott and Schofield's Gas Water-Heaters.

To overcome these (and other) disadvantages, the patentees propose to arrange for the cold water to enter the heater at two points—one, in the usual way, at the lower portion at A, and the other at the upper portion B. As soon as the water controlling valve C is opened by the rising of the float or bell when water is being drawn, the cold water from the inlet B falls upon or near the crown or top portion of the float D, instantaneously condensing the steam vapour underneath, dissipating the pressure, and causing the float to fall. As in this short time the cold water passing in through A is necessarily limited, there is no serious lowering of the temperature of the water in the body of the geyser, and the float almost immediately rises again, when it is subjected once more to the condensing influence of the water through B. Thus is set up a quick rising and falling action of the float, which, in turn, produces a continuous supply of boiling water at the draw-off tap E.

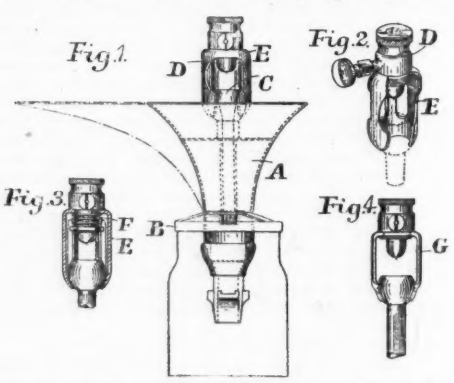
In the second form of heater shown, G is a stationary bell; and, when first filling and charging with water, air relief is effected by the small tube H and tap J, after which the tap is closed. Upon applying heat, expansion sets up in the bell, causing the water-line in the container to rise gradually and lift the ball-float K, whereby the valve C opens and passes cold water on to the crown of the bell. This immediately condenses the steam vapour in the bell, expansion stops, and the water retires to its original level—the cold-water supply at C being cut off simultaneously. Immediately the cold-water supply stops, expansion recommences, and the operation is repeated. Thus a continuous stream of hot water may be obtained from the draw-off tap E as long as the gas is in use.

Inverted Incandescent Gas-Burners.

WOOD, W. H., of Birmingham, and EDWARDS, A. N., of Farringdon Street, E.C.

No. 21,728; Sept. 26, 1913.

This is a modification of the invention described in patent No. 14,137 of 1911. The burner then described was suspended from the gas



Wood and Edwards' Inverted Incandescent Gas-Burner.

fixture, but had no fixed connection with it, so that it could be readily lifted off for cleaning or other purposes. According to the present

invention, a burner of the type then described is so constructed that the nipple carries a mixing chamber, and the feed tube of the burner is rigid throughout, and enters the mixing chamber. Further, one of the connecting elements (preferably that on the burner) takes the form of a ball carried by a stem, and the other element takes the form of a cupped ring split transversely to permit the stem of the ball to pass.

Fig. 1 shows a burner and connections constructed according to one method of carrying out the invention. Fig. 2 is the upper connecting element (on a larger scale) detached from the other connecting element. Figs. 3 and 4 show vertical sections through a modified form of the connecting elements.

The burner comprises the usual cone member A, traversed by a conduit terminating in a ball C, which is open at the upper end so that a clear passage is provided through to the mantle. The nipple D, provided with the usual gas-regulator, can be rigidly secured to a fixture by the usual screw-threaded gas-conducting orifice. Depending from the nipple is an approximately tubular member E, whose lower end is curved round to constitute a cup-shaped ring or seating for the ball. The tubular connection is provided with a large opening at one side above the cup-shaped portion, which is split transversely so that a smaller opening is provided on the same side, and the two openings join one another. The ball, being quite free in the cup-shaped ring provided by the lower portion of the element E, enables the burner to swing relatively to the nipple, so that vibrations in a lateral direction are not easily transmitted to it, and the burner can be instantly detached from, or attached to, the nipple.

In fig. 3, to absorb vertical vibration the connection E has a spring F interposed between it and a shoulder made integral with the nipple or constituted by a nut or other part secured to the nipple.

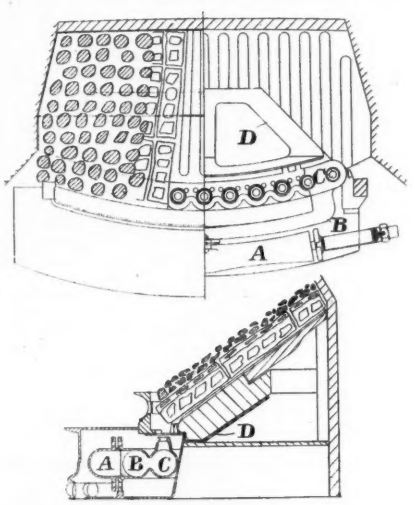
In fig. 4 the connecting element is made in the form of a stirrup G, and the split cup-shaped ring portion of it is thus carried by two arms only.

Gas-Fires.

AIRD, KENNETH, of Falkirk.

No. 22,385; Oct. 4, 1913.

This invention relates to gas-fires of the kind in which refractory ball fuel resting on or in close proximity to the hearth is heated by gas issuing from the nozzles of a burner disposed beneath the fuel in an approximately horizontal plane; and it consists in a construction of fire wherein the fuel is supported by fire-bricks inclined to the horizontal plane and is heated by a burner comprising an inlet tube, a mixing tube, and a nozzle tube—all enclosed by a movable front.



Aird's Gas-Fire.

As shown, the burner comprises a gas and air inlet tube A, a tubular mixing chamber B, in which air mixes in suitable proportion with the gas admitted through the injector nozzle, and a tube C formed or fitted with burner nozzles. The burner is loosely fitted to the base of a casting of such cross-section that, when the fire is in position, it rests against the grate bars of an ordinary register grate. The casting is formed with an upwardly inclined extension D adapted to support a fire-brick to which is cemented a second fire-brick conforming in shape to the wall of the fire-place; a tight joint being formed between the brick and wall by fire-proof cement or the like. Refractory fuel is laid in rows (as shown) on the fire-bricks; the end of each piece of the lower row resting against the front of the grate and immediately over a nozzle of the burner. On top of the refractory fuel are distributed layers of black fuel.

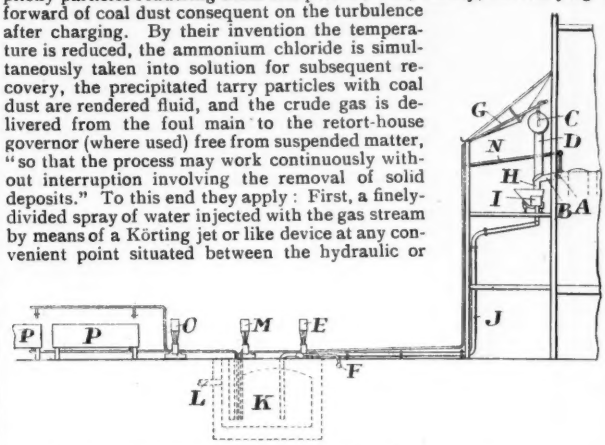
As shown, in lieu of being formed with the tubular members vertically over each other (which necessitates the raising of the fuel grate to a considerable height over the hearth), the burner is formed with the tubular members A B C parallel with each other in, or approximately in, the horizontal plane, so that they rest at or about the hearth level, and only the burner nozzles project upwards, or at an inclination to direct their flames into the refractory fuel. With this construction the grate supporting the fuel is kept at a low level, and the movable front which encloses the burner and rests on the hearth is made of greater width from back to front to accommodate the greater width of burner, and "not only lends itself to enhanced decorative effect, but also provides a greater width of upper surface or hob on which any culinary utensil may be placed and heated."

Treating Hot Gases Produced by the Distillation of Coal.

LEECH, W. J. B., and EDWARDS, A., of Leeds.

No. 20,964; Sept. 17, 1913.

In the working of vertical retorts and coke-ovens for the distillation of coal, the patentees point out, difficulty is experienced in continuous working, due to the accumulation of pitchy deposit in the gas take-off pipes and in the collecting or hydraulic mains, necessitating troublesome periodic cleaning by hand. Three conditions determine such deposits: Firstly, the high temperature of the parts affected, consequent upon the lesser degree of radiating surface compared with similar parts of horizontal retort plants, whereby the higher boiling constituents only of the tars are deposited, and in a solid or plastic state; secondly, the formation of crystalline ammonium chloride upon the separating pitchy particles rendering them less plastic; and, thirdly, the carrying forward of coal dust consequent on the turbulence after charging. By their invention the temperature is reduced, the ammonium chloride is simultaneously taken into solution for subsequent recovery, the precipitated tarry particles with coal dust are rendered fluid, and the crude gas is delivered from the foul main to the retort-house governor (where used) free from suspended matter, "so that the process may work continuously without interruption involving the removal of solid deposits." To this end they apply: First, a finely-divided spray of water injected with the gas stream by means of a Körting jet or like device at any convenient point situated between the hydraulic or collecting main and the retort mouthpiece; and, secondly, a finely-divided coal-tar spray injected against the gas stream at a point behind the hydraulic or collecting main—preferably in a vertically rising portion of the foul main.



Leech and Edwards's Treatment for Hot Distillation Products.

The diagram shows the application of the invention to a vertical retort installation. A is the water spray jet into the gas take-off pipe B; and C, the tar spray jet into the foul main D. The water is sprayed from the jet A in a state of subdivision minute enough to float with the gas in the form of a cloud or mist; the aim being to present as large a surface of water as possible to the gas. The tar (supplied by the pump E and feed pipes F G from the wells or the condensers) is sprayed from the jet C in sufficiently large particles to fall by gravity against the gas stream, and in quantity sufficient to remove the smaller particles of suspended tar fog. The falling particles of tar traverse the hydraulic or collecting main H and take up the pitch-like matter depositing there, and ultimately pass, by way of the hydraulic main overflow I and pipe J, to a small separating or circulating well K, along with the deposited water from the other spray. The tar overflow L from the circulating well K delivers into the general wells or cellars. The water is returned from the well K by the pump M and the feed pipe N (the pump being fitted with a relief-valve bye-pass to open at a pressure of from 30 to 60 lbs. per square inch) to the water injectors A—the aim being to keep the water continuously circulating in such a quantity as to reduce the temperature of the gas in the hydraulic or collecting main H to about 80° to 90° C. and dissolve the crystallizing ammonium chloride—utilizing for the cooling action the high latent heat of steam rather than the sensible heat of the water.

The circulating well K is proportioned so that relatively little cooling action takes place, the circulating ammonium chloride solution being maintained at or near 70° to 80° C. until of sufficient strength to crystallize, when it is pumped at O to a cooling tank or tanks P, separated from the crystals, and returned to the circulating well K. The cold tar spray from the jet C supplements the cooling action of the water spray from the jet A.

The invention therefore "consists essentially in the simultaneous application of regulated sprays of circulating water and coal tar, applied respectively before and after the hydraulic or gas collecting main of vertical or horizontal retorts, chambers, and ovens for carbonizing coal, to reduce the temperature of the gaseous products from the main to about 80° to 90° C., with the object of preventing the formation of, or removing, pitchy and other solid deposits, and the simultaneous recovery of ammonium chloride in the crystalline form, without prejudice to the quality of the gas."

Controlling Clusters of Gas-Burners.

COLBRAN, J. B., of Chiswell Street, E.C.

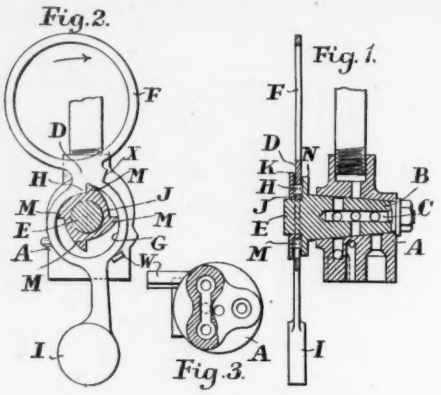
No. 3550; Feb. 11, 1914.

This invention relates to the actuating of a cock for a cluster of gas-burners in such a manner that a single movement of a lever causes a partial rotation of the plug, turning on the gas to one burner, the next movement of the lever turning on the gas to a second burner, and so on according to the number of burners in a cluster—the last partial rotation of the plug turning off all burners.

Fig. 1 (p. 232) is a section through the gas-cock and tumbler lever in the "all off" position. Fig. 2 is a front view with the front tumbler lever guard removed. Fig. 3 is an inverted plan (partly in section) of the body of the gas-cock.

A is the body of the cock; B, the plug; C, the central bore; and

D, the tumbler lever loosely mounted on the end E of the plug. The tumbler consists of an upper and ring-shaped end F for actuating purposes, a central cam-shaped cut-away portion G with an inwardly extending projection H and a weighted lower end I. On the end E is fixedly secured a ratchet wheel J provided with a flange K, which forms the tumbler guard, and with projections or teeth M. Over the ratchet



Colbran's Burner-Cluster Controller.

wheel, by its central cam-shaped cut-away portion G, takes the tumbler D, which engages, under the action of its weighted end I, with the ratchet wheel J in the manner shown in fig. 2—that is to say, the projection H of the lever engages with one of the teeth M of the cam disc J; the tumbler loosely fitting between the guard K on the disc J and a flange N on the plug B of the cock.

In action, on pulling over the tumbler lever in the direction of the arrow in fig. 2, it carries with it, by the engagement of the projections H and M, the plug; and on the pull on the tumbler being removed, the tumbler, under the action of its weight, rides (the cut-away portion G being shaped for this purpose) over the projection M, with which it was in engagement, and engages with a succeeding projection M, and so on.

Starting with the position shown—the "all off" position—the first part revolution of the plug admits gas to the first burner; the next part revolution admits gas to a second burner; the next part revolution of the plug admits gas to a third burner; while the last part revolution of the plug cuts out all burners, bringing the plug to the normal position ("all off") as in fig. 1.

The return movement of the tumbler is limited by the stop W; while the pull-over is stopped by the projection X on tumbler D engaging the other side of the stop W on the body of the cock.

APPLICATIONS FOR LETTERS PATENT.

16,670.—Potter, W. G. D., "Incandescent burners." July 13.
16,680.—Frank, H., "Gas and other radiators." July 13.
16,799.—Sharman, A. W., "Locating water or gas pipes." July 15.
16,857.—Hall, W. A., "Production of oil from coal and lignite." July 15.
16,902.—Päschke, B., "Regenerative furnaces." July 16.
16,918.—Rigby, T., and Wetcarbonizing Limited, "Peat gasification." July 16.
16,981.—Berlin-Anhaltische Maschinenbau-Akt.-Ges., "Tar separators." July 17.
16,999.—Carpenter, C. C., "Gas-lamps." July 17.
17,005.—Davis, G. K., "Gas-washers." July 17.
17,036.—Lederer, A., "Electric gas-lamps." July 17.
17,046.—Grier, T., "Acetylene generator." July 18.
17,098.—Aublet, Harry, and Co., Ltd., and Stanley, E. J., "Gas-heated irons." July 18.
17,099.—Aublet, Harry, and Co., Ltd, and Wade, J. T., "Incandescent gas-lamps." July 18.

Supply of Mantles in Birmingham.

Some further reference was made at the Birmingham Chamber of Commerce last Wednesday to the Corporation trading in gas mantles. The General Purposes Committee reported that their Chairman, with Mr. J. S. Taylor, Mr. T. A. Bayliss, and the Secretary, had an interview with Sir Hallewell Rogers (the Chairman of the Corporation Gas Committee), Alderman G. H. Lloyd, and Mr. R. S. Hilton (General Manager and Secretary of the Gas Department), with reference to the matter of "Standard" gas mantles, and were informed that it was not the desire of the Gas Committee unduly to extend municipal trading, but that their only wish was to obtain the best mantle in order to do justice to their gas. A number of firms were invited to quote, and the samples of three firms were selected as standard; the orders then being given in bulk on behalf of the Corporation and the Gas-Fitters' Association. They were further informed that the mantles were sold only through retailers, and that there did not therefore appear to be any injustice to retail traders. The Committee understand from a member who purchases mantles wholesale, that when he applied to the Corporation he was told he could only be supplied if he joined the Gas-Fitters' Association. This he did, and when he asked for supplies on wholesale terms he was refused. He further informed the Committee that only five firms in the city were able to obtain "Standard" gas mantles on wholesale terms. The Committee have instructed the Secretary to obtain further information from the member in question.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Private Bills:—

The Sheffield Corporation Bill was read a second time and committed.

The Northwich Urban District Council Bill, Wadhurst Gas Bill, and Southend Gas Bill were reported with amendments.

The Gas Provisional Order (No. 2) Bill and the Gas Provisional Orders (No. 3) Bill were reported with amendments and re-committed to a Committee of the Whole House.

The Tees Valley Water Bill, Local Government Provisional Orders (Gas) Bill, Middlesbrough Corporation Bill, South Suburban Gas Bill, and Leyland Gas Bill were read the third time and passed.

The Commons' Amendments to the Newport Corporation Bill, Skegness Gas Bill, and Whitwell Gas Bill were agreed to.

Petitions were presented by the Stepney Borough Council against alterations in the City of London (Various Powers) Bill, and by the West Riding County Council against the Sheffield Corporation Bill.

HOUSE OF COMMONS.

The Gas Light and Coke Bill, West Gloucestershire Water Bill, and Edenbridge Gas Bill were reported with amendments.

The Skegness Gas Bill, Ellesmere Port and Whitby Urban District Council Bill, Whitwell Gas Bill, and Liverpool Gas Company Bill were read the third time and passed.

A petition has been presented by the Somerset County Council against the Weston-super-Mare Urban District Council Bill.

Edinburgh and District Water Order Confirmation Bill.

This Bill, to confirm a Provisional Order relating to Edinburgh and district water, was presented in the Upper House by Lord Emmott, and read the first time.

LIVERPOOL GAS COMPANY AND THE LABOUR PARTY.

Opposition to the Company's Bill Withdrawn.

In the House of Commons last Thursday, the Bill of the Liverpool United Gas Company came up for third reading.

Mr. T. P. O'Connor said that on the motion for the second reading of the Bill he undertook to use his best efforts to induce the Company to meet some of the demands made by certain of the Labour representatives [see *ante*, p. 114]. In regard to the Conciliation Board, the Directors stated that it would require a good deal of consideration, and they were not at the moment prepared to meet the demand. With respect to wages, this matter had been taken into consideration, and was being considered by the Directors at the present time; and he could assure his honourable friends that there would certainly be an addition to the pay of the men. On the other outstanding point, as to the relations between the Company and the trade union, if a *bonâ fide* majority of the workers desired to be represented by an official of the Gas Workers' and General Labourers' Union, the Company would offer no opposition. He therefore hoped that, under these circumstances, the opposition to the Bill would be withdrawn.

Mr. Clynes said, in view of the statement just made, he would not proceed with his motion for the rejection of the Bill. By the term "majority" he understood was meant the majority of the particular class that might have a grievance for the time being.

The Bill was then, as recorded above, read the third time and passed.

LEGAL INTELLIGENCE.

LIABILITY FOR REINSTATEMENT OF PAVEMENT.

HIGH COURT OF JUSTICE—DIVISIONAL COURT.

Wednesday, July 22.

(*Before Justices* Horridge *and* Lush.)

Brame and Clark v. Commercial Gas Company.

This appeal by the defendants from the judgment of Judge Smyly, sitting at the Bow County Court, awarding plaintiffs £35 and £30 respectively in respect of damages caused through tripping over uneven pavement,* raised the important question whether the Borough Council and not the Gas Company were liable.

Mr. Macmorran, K.C., and Mr. J. D. Cassels appeared for appellants; while Mr. M'Call, K.C., and Mr. Abinger represented the respondents.

Mr. Macmorran said the Gas Company were laying pipes in Canton Street, Poplar, and under the Gas-Works Clauses Act they were bound to reinstate the pavement. By section 114 of the Metropolis Management Act, 1895, however, borough councils were authorized to do the work and charge the gas companies with the cost. The section provided that wherever the permanent surface of the street was broken up it should be lawful for the borough council, in case they thought it expedient so to do, to fill in the ground and make good the surface,

* See "Journal," Vol. CXXV., pp. 846, 921.

instead of permitting such work to be done by those who broke up the soil; and the expense of filling in the ground and making good the pavement should be paid by the person or company breaking up the surface. In the case of *Cressy v. South Metropolitan Gas Company*, it was held that where a gas company had opened-up a street they were not liable for injury caused through the reinstatement having been negligently done by the council. The question for decision was whether the principle of the case applied to the present. Prior to pulling up the pavement, the Company were informed that the Council would shortly be re-laying the street, and notice was given to them in the manner prescribed. His point was that the practice being, as the Judge had found, for the Council to undertake the work of filling in, the responsibility of the Gas Company ended a reasonable time after they had given notice to the Council that the duty which they had undertaken under section 114 was to begin, and unless it could be shown there was some negligence on the part of the Company before the expiration of this reasonable time, they had no responsibility in the matter. The fact that their man did look over the pavement before the Council got to the place was only a voluntary act which ought not to fix the Company with responsibility. It was not the work of the Company which caused the accident; and they should not be in a worse postion for having voluntarily done something for the protection of the public, when they would not have been responsible if they had not done anything at all. When the Council intimated that they were going to do the work, the Company had no duty or authority to do anything more.

Mr. Justice HORRIDGE said there was nothing in the section about giving notice, and therefore the Gas Company would be in charge of the disturbed highway. If the County Court Judge on the facts drew the inference that the Gas Company were left in charge, they would merely have to consider whether there was evidence to support his finding.

Mr. MACMORRAN said what happened was this: The work was begun on July 23 and finished on Aug. 1; the work being done in sections. As each part was done notice was sent to the Borough Council, and they sent their men to relay the street permanently. But they did not keep up with the Gas Company's men; the consequence being there was always a bit between the two sets of men which was not complete, though the Council had undertaken the work of reinstating the whole surface. The accident happened at a spot where the work was finished on the 28th. Notice was given on the 29th, and the Council issued the order for repairing the same day. In these circumstances, some of the men belonging to the Gas Company, after their work in the street was finished, raised some of the stones which had been temporarily put down. The Company would not have been liable if they had done nothing at all, as the Council had undertaken the duty of filling in the surface.

Mr. Justice LUSH: Whose fault do you suggest it was that the stone was not in a proper position?

Mr. MACMORRAN: The fault of the Council, as the learned Judge had found that two clear days was a reasonable time.

Mr. Justice HORRIDGE: He found that the Gas Company were left in possession until the Council were ready to relay the pavement permanently.

Mr. MACMORRAN submitted there was no evidence to justify such a finding. The responsibility passed from the Gas Company as soon as they laid the pipe; and the Council, directly they received notice, should have restored the road. Directly the Council resolved to do the work, the responsibility was upon them.

Mr. Justice HORRIDGE said if this contention was correct there must be an interval during which no one was responsible.

Mr. JUSTICE LUSH: Suppose the Council, after receiving notice, had said they could not do the work till the 10th, do you say the Company would not be responsible?

Mr. MACMORRAN: Certainly, because we are not even bound to fill in the trench.

Mr. JUSTICE HORRIDGE said the Judge had found, as a fact, that the Council had not taken over the street as a whole.

Mr. MACMORRAN said his submission was that they had.

Mr. M'CALL submitted that, the question being merely one of fact, the finding of the learned Judge was conclusive. If it was a question upon which there was any appeal, then his submission was that there was no substance in the appeal at all. In other words, where a body had been guilty of a nuisance in the public highway, it was for that body to show some statutory defence, or some novation transferring the liability to a third party.

Mr. Justice HORRIDGE said the Court did not desire to hear further argument. After stating the facts of the case as above, his Lordship said that, under section 10 of the Gas-Works Clauses Act, there was no doubt an obligation thrown on the Company of making good the highway and keeping it in repair for twelve months. It had been contended that under the Metropolis Management Act the liability of the Gas Company to perform the duty cast upon them by section 10 was transferred to the Borough Council directly that body decided to take upon themselves the work of making good the highway and filling up the trench. Section 114 meant that the local authority had the right to take over the work; and, from the moment they took it over, the work was out of the hands of the Company, and they were no longer responsible for any default on the part of the local authority. He did not think the mere passing of the resolution to do the work relieved the Company, who were in charge of the work, from seeing that the work was right until it was handed over to the representative of the Council. The case of *Cressy v. South Metropolitan Gas Company* did not force the Court to decide that the resolution was the time to look to, because there the work had been done by the local authority. The County Court Judge had unnecessarily implied an agreement; but he afterwards directed his mind to the real question when he said: "I hold they are liable for the pavement being kept reasonably safe until it has become the duty of somebody else to do it; and they have not satisfied me that they had undertaken that duty." He thought the case was disposed of by the finding of fact that the Gas Company had not satisfied the learned Judge that anyone else had undertaken the work.

Mr. Justice LUSH said he was of the same opinion. *Prima facie* the Company would continue to be under a statutory duty to the public, which was provided for by section 10 of the Gas-Works Clauses Act until the street was made up. The burden must be on the Company to show that something had happened which terminated the liability. What was the something which they suggested did terminate the liability? It was that, under section 114 of the Metropolis Management Act, the Council had a right to come in and do the work. But the learned Judge had found that the Company had not shown that the Council had come in and undertaken the work. The appeal would be dismissed with costs.

Mr. MACMORRAN asked for leave to appeal, as the matter was one of considerable importance to gas companies. His clients would undertake to bear the expense of the appeal whatever the result.

Mr. M'CALL objected; and, after a short discussion,

Their LORDSHIPS refused leave.

MISCELLANEOUS NEWS.

GAS SUPPLY OF PARIS.

Annual Report of the Gas Company.

At a recent meeting of the shareholders of the Paris Gas Company, the Directors presented their sixth annual report, covering the twelve months ended Dec. 31 last. It furnished the following particulars as to the working and financial position of the undertaking.

GENERAL STATISTICS.

The quantity of gas sent from the works in the period referred to was 481,022,627 cubic metres, or rather more than 16,980 million cubic feet; being an increase of 9,692,084 cubic metres, or about 342 million cubic feet, on the output in 1912. The day consumption reached 215,714,140 cubic metres, or 7614¾ million cubic feet; being an increase of 8,019,500 cubic metres (283 million cubic feet). The quantity of gas sold was 455,685,580 cubic metres (16,085¾ million cubic feet), or 4 per cent. more than before. The revenue from the sale of gas was 89,546,624 frs. (£3,581,865), compared with 87,755,398 frs. (£3,510,216) in 1912; being an increase of 2 per cent. The number of consumers on the books at the close of the year, in comparison with 1912, was—

	Ordinary.		Free-Fitting.		Total.
1912	389,874	..	303,904	..	693,778
1913	408,691	..	304,916	..	713,607
Increase.	18,817	..	1,012	..	19,829
Do. per cent. . .	4·82	..	0·33	..	2·85

For the public lighting of the city there were in use on Dec. 31 last 61,622 burners, compared with 58,838 at the close of 1912. They were divided as follows: Ordinary, 1233; incandescent, 60,389—a decrease of 6 of the former, and an increase of 2790 of the latter. As shown in recent articles on the public lighting of Paris, there has been a considerable extension of the high-pressure system. On Dec. 31, 1912, there were in use 670 light centres, having a total illuminating power equal to 1,536,000 candles; whereas at the close of last year the number was 1221, representing 2,571,000 candles. Further extensions are being carried out.

The number of rising pipes for the supply of tenements in use on Dec. 31 last was 58,428, against 52,219 on Sept. 1, 1907, when the Company undertook the supply of gas—an increase of 6209; the consumers taking their supply from them numbering 581,887, compared with 449,662 at the earlier date, or 132,225 more. The increase in the year was 19,088, against 18,966 in 1912. The length of mains laid at the close of last year was 2,039,972 metres, or about 2,244,000 yards; being an increase of 62,771 metres, or about 69,000 yards, in the twelve months. Since the Company have been in possession, the mains have been extended by 299,764 metres, or about 180 miles.

FINANCIAL POSITION.

Coming to the financial portion of the report, it is stated that, in addition to the 89,546,624 frs. received from sales of gas, the residuals, gas-meters, fittings, &c., produced 24,195,274 frs.; making together 113,741,898 frs. (£4,549,676). The expenses for the year, including 1,586,842 frs., the Company's remuneration, came to 92,287,632 frs. (£3,691,505); so that there was a balance of 21,454,266 frs. (£858,171), which passes into the hands of the Municipality, as compared with 23,460,816 frs. (£938,433) for 1912. It is pointed out, in explanation of the difference in these amounts, that there were increased charges to be borne last year in respect of the loan of 1912 and of the workmen's pensions. Had it not been for these, the balance would have been about 300,000 frs. more than for 1912. The Directors consider the results of the year's working very satisfactory, in view of the condition of the coal market. Residuals found a good market, and coke was sold at remunerative prices. Notwithstanding the competition of electricity, there was, as already stated, an increase in the quantity of gas sold, mainly for use in the daytime; affording proof of the success of the Company's efforts to extend the employment of gas for heating, cooking, and minor industrial operations. The consequence has been an appreciable augmentation in the number of prepayment meters fixed in small lodgings and furnished houses. The system of supplying on hire radiators for domestic heating has been well received; and the Directors intend to increase the number available for the use of the consumers.

As stated above, a sum of 1,586,842 frs. goes to the Company by way of remuneration. Certain additions brought it up to 1,809,380 frs.; but some necessary deductions reduced this to 1,785,278 frs. (£71,411)—the net profit for the year. After taking 5 per cent. for the legal reserve and adding the carry-forward, there was a disposable balance of 1,943,209 frs. (£77,728). The Directors recommended the declaration of a dividend of 5½ per cent., or 13 frs. 75 c. per share, amounting to 1,650,000 frs. (£66,000), leaving a balance of 293,209 frs. (£11,728) to be carried forward.

COAL SMOKE ABATEMENT COMMITTEE.

Further Evidence on Behalf of the Gas Industry.

The Departmental Committee appointed by the Local Government Board to consider the question of smoke abatement* held further sittings on Wednesday and Thursday of last week. Wednesday was devoted to hearing evidence as to the pottery trade.

GAS IN THE POTTERY TRADE.

Dr. *Petgrave Johnson*, the Medical Officer of Health to the County Borough of Stoke-on-Trent, was the first witness. He remarked on the necessity for very slow heating, which involved the production of a considerable amount of smoke when burning coal. Gas had been tried for the ovens and kilns, but without much success—at any rate, gas had not been adopted for the purpose to any very great extent. Pressed to give further details, he said that, for enamelling kilns, gas heating had been in use for some years, and had been successful. Nevertheless it had not been extensively adopted. He could not, however, point to any instance in which gas heating had been abandoned after it had once been adopted for enamelling kilns. For other purposes in the pottery trade gas had been tried and abandoned. While not professing to speak as an expert in the matter, witness said he understood that among the reasons for the non-use of gas was the difficulty associated with the large area to be heated, and the fact that the firemen in the trade were not skilled in the manipulation of the gas supply.

Mr. BREVITT (the Town Clerk of Wolverhampton) asked if it was not the fact that gas had been installed quite successfully at Messrs. Meakins' works at Tunstall.

Witness replied that it had only been applied to kilns, and not to ovens.

Other questions were put to witness suggesting that the Britannia Pottery, Glasgow, ran their works without producing smoke, by the use of gas, and that therefore the existing state of affairs in the Potteries district as regards smoke could be remedied. Witness, however, was unable to offer any opinion on the point.

Mr. *H. G. Budden*, Works Manager to Messrs. Doulton and Co., and also representative of the London Chamber of Commerce, expressed the opinion that with the present state of knowledge it was impossible to avoid making smoke in the pottery trade. For this reason provision should be made in any new legislation for that industry to be exempted in some form. He had experimented with every known form of fuel, including coal, coke, oil, and gas; and although he was using gas with one or two small kilns at the present time, no great measure of success had been achieved with it. Such experiments were exceedingly costly, however; and he suggested that in a matter of this kind, where the results were as much, if not more, for the benefit of the public as for the manufacturer, the Government should contribute towards the cost of the experiments. There were many schemes in mind in the pottery trade for the abolition of smoke, one of which was the application of gas to long continuous kilns; but the expense would be far beyond the means of any individual firm, or even a combination of firms He put the cost at £7000 or £8000, besides the loss of time, and probably loss of material, during the experiment.

Mr. BREVITT put it to witness that a Mr. Murray had spent considerable time and money in experiments upon ovens heated by gas which had been crowned with success.

Witness, while assenting to the fact that much time and money had been spent in this connection, would not agree that success had been achieved. Doultons had considered the matter, and were even now experimenting. He had four kilns at present heated by gas which were suitable for certain classes of ware. Wherever it could be done, Doultons adopted gas. He was not in a position to say whether Messrs. Meakins, of Tunstall, had successfully adopted gas. A good deal was heard from time to time of success in this connection; but, when the cases came to be investigated, the success was usually found to be comparative. His experiments were with producer gas. At his Company's Staffordshire works, Mond gas had been tried; but he had heard some very doleful tales of the experiments that had been made. He could not, however, speak from personal experience.

Answering Professor COHEN, upon the point as to where the difficulties arose in gas heating, which seemed a much better means of regulating the heat than with coal, witness said the great difficulty was the vast area that had to be heated. The air had to be admitted to burn with the gas at the point where it was desired that combustion should take place. Although it was easy to get local heating, it was difficult with a kiln having a capacity of from 18,000 to 20,000 cubic feet to heat right through the mass of it.

Professor COHEN: But the Farnley Iron-Works use Mond gas exclusively, and they turn out some large pieces—sinks and baths.

Witness said that some pottery could be burned in muffles, but it was expensive. The kilns he was experimenting with in connection with gas had small heating chambers.

EVIDENCE OF MR. EDWARD ALLEN.

Mr. *Edward Allen*, the Chief Engineer of the Liverpool Gas Company, gave evidence on Thursday. He said he had been appointed by the Council of the Institution of Gas Engineers to represent them before the Committee. The gas industry was interested in the question of smoke abatement on general grounds, but had special interest as purveyors of smokeless fuel in the form of gas and gas coke. Nevertheless, he did not wish to push the financial interest of the industry. Gas companies were originally formed with the object of supplying light. It was soon realized, however, that there were bye-products; and the first, of course, was coke. This remained the only bye-product for some years. In the old days the method of heating retort-settings was very extravagant; the firing being direct. For years, however, the regenerative method of firing had been in use, and the result had been that the quantity of coke required to carbonize the coal had been reduced from about 4 cwt. per ton to about 1½ cwt.; while the amount of coke available for sale had increased from about 7 cwt. per ton of coal carbonized to nearly 11 cwt. The calorific value of good gas coke could be taken as being as high as that given by the slacks used for boiler furnaces. The reason for this was that with the slacks a large amount of the volatile matter given off was not made of efficient use under the boiler; whereas with coke the radiation was very complete, and much more regular than with slack. Scientifically, the calorific value of coke was as high as slack, but practically it was greater. It could now be taken that, on an average, 12,000 cubic feet of gas were manufactured per ton of coal, and 10 cwt. of coke recovered. The make of gas was as high as 13,500 cubic feet; and thus demonstrated the great strides that had been made during recent years in the production and distribution of gas. There was no question that there was a very keen spirit in the industry, amounting almost to enthusiasm, in regard to the improvement and maintenance of plant and apparatus. The effect of these improvements was well shown in "Field's Analyses." An inspection of these would show it to be quite usual for 60 per cent. of gas users to be provided with cookers.

The CHAIRMAN: Is that the Liverpool experience?

Witness said not yet, because Liverpool had only recently got to work in this direction. He had, however, no hesitation in saying it was usual to find throughout the country that 60 per cent. of the gas consumers were using gas-cookers. A recent statement showed the average over the whole country to be 50 per cent.; but in some towns, the proportion was as high as 90 per cent. Gloucester was a case in point; and the South Metropolitan Gas Company were approaching 90 per cent. The price of gas at Gloucester was 1s. 11d. per 1000 cubic feet. A good many consumers took gas for a great part of the year solely for heating. The coal-fire would be put out of use during the summer months; while the installation of water-heaters was being rapidly extended, which enabled the kitchen fire to be kept unlighted for longer periods in the winter than would otherwise be the case. The education given to girls in elementary and secondary schools in the use of gas-cookers was resulting in this apparatus becoming very popular. Water-heaters had not made very great strides in Liverpool, because circumstances had been against the Company; but there was no doubt that throughout the country gas water-heating appliances were increasing rapidly. This was brought about also by the fact that a water-heater could be installed on the flow-and-return pipes of the ordinary hot-water system, so that the kitchen fire or the gas-circulator could be used as desired. The better class houses were more likely to adopt an expensive apparatus like this; but he was supplying a cheaper one.

Professor COHEN: What is the price?

Witness said the charge was 3s. per quarter for the hire of these boilers; the Company fixing and maintaining them free of charge.

The CHAIRMAN: You do this nearly at cost price.

Witness replied in the affirmative. He took care that every incidence of cost was met by an equivalent revenue, although some corporations—Glasgow, for instance—supplied them free of charge. The object of these corporations was to increase the use of gas, and at the same time the comfort of the people; and they felt it a duty to offer these cheap terms. He, however, endeavoured to make each branch of the business self-supporting. This particular branch was not much more than self-supporting. The Company had not much experience of this class of business, and for the present were estimating the life of the apparatus at from 8 to 10 years. If the estimate was right, the account would be clear; but if the life was much shorter than this, they would probably have to adjust the terms. He thought, however, that the estimate was about right. Because of this great increase in business, costs had been considerably reduced. It was remarkable that while during recent years there had been a general advance in the price of raw materials and manufactured goods, this did not apply to the price of gas. The manufacturer and the householder found gas down, and all other things up. In support of this, he submitted the following figures; the undertakings being selected as average ones for both municipalities and companies:

Net Average Price per 1000 Cubic Feet Received ("Field's Analysts").

—	1903.	1913.	Decrease.
	d.	d.	d.
Corporations—			
Birmingham	26·6	19·4	7·2
Bolton	31·7	29·4	2·3
Bradford	24·4	23·0	1·4
Edinburgh and Leith	36·4	31·3	5·1
Glasgow	27·8	22·7	5·1
Leicester	28·8	28·0	0·8
Manchester	33·5	26·3	7·2
Nottingham	33·6	29·1	4·5
Oldham	26·6	22·3	4·3
Salford	30·7	27·3	3·4
Companies—			
Bath	27·4	22·2	5·2
Brighton	36·4	34·1	2·3
Bristol	26·8	22·3	4·5
Liverpool	32·1	26·2	5·9
Newcastle-on-Tyne	21·9	21·6	0·3
Plymouth	21·0	18·8	2·2
Sheffield	21·6	13·5	8·1

From these figures it would be seen that the largest reduction in the case of the municipalities was 7 2d., at Birmingham and Manchester, although the actual price in Birmingham was lower than in Manchester. Leicester, where only a small reduction had been made, was exceptional, and much better things could be expected later on when the effect of the new plant would be felt. In the case of the companies, the largest reduction was at Sheffield—viz., 8·1d.—Liverpool coming next with 5·9d. He did not know the details of the Newcastle undertaking, and could not therefore explain the small reduction there. Generally, however, there had been reductions of from 30 to 40 per cent., in spite of the increase in the price of coal. Sheffield was fortu-

* See "JOURNAL" for July 14, p. 117.

nate in being able to buy in a cheap coal market, and also in having a good market for their bye-products, with the result that gas was sold there at the cheapest price of any company in the country. The Widnes Corporation, however, sold cheaper still. The main reason for these reductions of price were improvements in the plant generally, and especially in the retort-house. It was not until the De Brouwer charger and coke pusher was put on the market less than 15 years ago, followed by the Fiddes-Aldridge simultaneous charger and discharger, that any great economy was effected. With hand labour, the cost of wages in the retort-house was about 3s. per ton of coal carbonized—a figure which had been reduced to 8d.; and even in small installations, where the plant was not working under the best conditions, the cost of labour did not exceed 1s. 6d. Following these machines came various systems of vertical retorts, in which the cost of labour was claimed to be as low as 6d. per ton. His own experience with vertical retorts, however, was not long enough to speak with authority; but he believed this figure was justified. Another form of carbonizing was coming into operation—*i.e.*, the use for gas making of coke-ovens known as the "Munich Chambers," in which the cost of labour was claimed to be 3d. per ton of coal carbonized, or about ¼d. per 1000 cubic feet. This system had been adopted in one or two places in England, including Birmingham. The abolition of direct-firing in favour of the regenerative system not only increased the quantity of coke for sale per ton of coal, but it enabled higher heats to be obtained, and resulted in a greater yield of gas. Further, the present large settings of retorts—ten in a bed—would not have been possible without gaseous firing. Economies had also been effected outside the retort-house by the use of mechanical appliances for the handling of coal and coke. As an example, he mentioned the fact that at Liverpool the cost of putting coal into store used to vary from 10d. to 2s. per ton when hand labour was used; whereas, by the use of the jib crane and the grab, this had been reduced to 2d. per ton. On the question of the prepayment meter, witness pointed out that this was introduced in Liverpool in 1888. This was the first installation of this type of meter in the country. Originally only a pendant or bracket and boiling ring were supplied free with the meter; but since then a small cooker had been added for a slight extra charge over the 7d. extra on the price of gas for the ring and fitting. The result had been the complete abolition of the paraffin lamp, which was the cause of so many accidents in the past, especially in Liverpool. While the Company were entitled to charge 10d. extra for the pendant, boiling ring, and meter, it was found that 7d. covered the capital cost. The additional extra charge for the cooker varied from 6d. to 1s., according to the size. The Liverpool Corporation, although owning the electricity works, encouraged the use of gas in their own workmen's dwellings, and provided the pipes and arranged for the prepayment supply. In this he considered the Corporation were acting very wisely, because they enabled the poor man to have what he needed—viz., a commodity which provided him with light and heat. Gas was certainly cheaper than electricity for both purposes. In this connection, he added that although complaints were made by many gas engineers of the unfair methods by which corporations conduct the competition of their own electricity undertakings, this could not be said of Liverpool, where the public lighting, also, was for the most part carried out by gas.

Mr. BREVITT: Do they still have coal-fires in the dwellings?

Witness said the grates still existed, but to what extent they were used in the winter he did not know. They were employed, because the Gas Company supplied coke for the purpose.

On the question of testing gas by the calorific value, witness anticipated a further reduction in price by the abolition of the illuminating power test. This would enable gas companies to give the greatest number of heat units per penny. That illuminating power was useless was shown by the fact that he knew of a flat-flame burner which gave 16-candle power, as against 13 candles with other burners using the same gas. He regretted that many municipalities inflict a burden on their gas undertakings by allocating large sums of money out of profits to the relief of the rates; and in so far as this policy necessarily keeps up the price of gas, it was opposing the very principle this Committee had been set up to investigate—viz., it encouraged the making of smoke by restricting the spread of the use of gas.

The CHAIRMAN: That argument appears very public-spirited on your part.

Witness: In the public interest it is the best policy.

The CHAIRMAN: It is very interesting to hear you say so; but I did not expect to hear it from a private company that gas should be supplied by municipalities at cost price.

Witness said that Manchester for many years had allocated £50,000 per annum from the gas profits to rate relief, and the figure had been as high as £70,000. He did not consider this a judicious policy.

As one reason for the reduced price of gas to the consumer, witness referred to the improvements, and consequent reduced price, of gas appliances. As an instance of what can be done with gas for cooking, he specially mentioned two examples. He recently supplied a gas-cooker to a consumer in a provincial town where the price of gas was 4s. 3d. per 1000 cubic feet, less 1 per cent. for prompt payment. A prepayment meter was fitted to ascertain the cost of the gas. The previous Monday, he was informed that breakfast, consisting of tea, toast, bacon, and tripe fried in batter for four persons (this was a special dish in the particular town), was prepared in 12 minutes, and that a penny placed in the meter gave sufficient gas for two such breakfasts. Thus the cost per breakfast was only ½d. The second instance was that of dinner for six persons, consisting of soup, fish, joint, vegetables, two sweets, and cheese rings, was cooked in one hour. The gas consumed was 26 cubic feet, and as the price of gas in that case was 2s. 1d., the cost of the dinner was only 0·65d. As to gas-fires, marvellous improvement had been made in the design and efficiency of them, and it could now be claimed that they gave between 50 and 60 per cent. of the total heat of the gas as radiant heat, and 20 per cent. convected heat. He went so far as to say that this heat was as healthy as sunlight, as it heated the objects in the room and not the air.

The CHAIRMAN: If you get such results as that, is not the atmosphere of the room affected at all?

Witness: Not at all.

With such results, do you calculate to supersede steam heating entirely?—Absolutely. I will not say that it is more economical, but more hygienic conditions cannot be obtained.

On the hygienic side of the question, witness said he would like to read an extract from the "Lancet" of July 11, 1914, where the following remarks were made after testing certain gas-fires: "These results justify our expressed conclusion that 'the present attitude of the gas-fire industry towards all questions of improvement is a most satisfactory one, and our inquiry shows that we may fairly expect in the near future an encouraging and hopeful issue.' Progress in the direction indicated means that no reproach based on hygienic considerations against the radiant system of gas heating can remain. We are still continuing tests with fires received from other makers, and we shall publish the results from time to time as the experiments are completed." Witness then went on to deal with the comparative cost of heating a room by means of gas and coal. An experiment had been made in a room under his control, 14 ft. by 12 ft. by 9 ft. 6 in. for seven days, ten hours a day. The amount of coal burned was 2 cwt., costing 23s. 4d. per ton or 2s. 4d. for the 2 cwt. There was, of course, the labour in carrying the coal in and the ashes out; while the efficiency of the coal used was only 30 per cent. In the same room subsequently a 10-inch gas-fire, consuming 18 cubic feet per hour, was installed. It consumed a total of 1260 cubic feet of gas, which, at 2s. 1d. per 1000 feet, came to 2s. 7½d. There was thus a slightly higher cost; but the heat could be much more easily regulated, and the efficiency was much higher—viz., 60 per cent. radiant heat and 20 per cent. convected heat. As to ventilation, the gas-fire effectively displaced 9000 cubic feet of air per hour, and changed the air of the room fully five times per hour. The coal-fire would do this twice as quickly; but it created draughts. The gas-fire was set in front of an ordinary grate, and the only ventilation was through the flue of the fire. There was every anticipation of a reduction in the price of gas, which would bring the cost in both cases to about the same figure.

Professor COHEN: Do you mean to say that the ventilation was about what you say?

Witness: The information was from my assistant. It is, of course, a matter of estimating the difference of temperature which will give rates of flow.

I have tested it myself, and the proportion of the rate of flow is much less with gas-fires?—This was not a hermetically sealed grate.

After referring to the fact that the same policy of simple hire is being adopted extensively in regard to circulators, geysers, califonts, and washing boilers for laundry work, witness went on to say that, in the opinion of the gas industry, the time had come for the abolition of the domestic coal-fire, which was so large a contributor to the smoke nuisance, because the work done by it could be met by the use of gas appliances in a better and less costly manner with possibly one exception—namely, the constant use of a fire for heating a room, which, at present prices of gas and coal, would be slightly more costly with gas than with coal. To meet this difficulty, however, he suggested the more extensive use of gas coke, which he had proved by experience in his own house could be used in an open grate.

The CHAIRMAN: But you could not supply the whole of the domestic demand in Liverpool?

Witness: We have not yet had the opportunity; but we could supply a great deal more than we do at present. We should not then send 5000 or 6000 tons of coke abroad every year. We should like to keep this coke in Liverpool, in order to remove the smoky condition of the atmosphere.

Continuing, witness said that it was necessary, in order to obtain the best results, that the coke should be broken into about 1¼-inch cubes, to ensure free combustion. The information from his tests was that 44 per cent. radiant efficiency could be obtained from a coke-fire, against 19 per cent. with coal. It was possible to maintain the temperature of a room at a proper degree, and the combustion was quite good, provided a little care was taken to ease the bottom of the fire.

The CHAIRMAN: Do you mean that pressure should be exercised upon householders by absolute prohibition of coal?

Witness: I would not like to give evidence of that nature.

The CHAIRMAN: It is suggested that as soon as the economical conditions favour the use of gas it might then be justifiable to put some little restraint upon the consumer with regard to smoke?—Compulsion is a word one does not like.

Compulsion, of course, would take the form of absolute prohibition?—Would it not rather be better that the domestic chimney giving forth smoke might be dealt with, and let the householder consider it his duty, whatever he might use in his grate, to avoid smoke? Unless you deal with the domestic grate you are not going to deal with the problem.

Then we are approaching the period when smoke from the domestic chimney should be considered a legal nuisance?—That is my view, because we provide gas to do a great many things, and we provide coke to do the rest.

Mr. BREVITT: Can poor people buy this coke?

Witness: We are only too delighted to sell it.

Is it sufficiently cheap?—Yes.

Is it cheaper than coal?—Yes. In many cases gas undertakings are breaking it and selling it in small parcels to meet the public wants.

The CHAIRMAN: How is it then that people do not rush to buy your coke?

Witness: If I knew, I should endeavour to remove the barrier. As a matter of fact, there has been a prejudice for many years in favour of the blazing fire. People like to poke something; and the fire responds to the poker. I think it is purely sentiment. The price of our coke is 13s. 4d. per ton in the yard, against 1s. or 1s. 1d. per cwt. for poor coal. Next winter we are going to see that the poor people realize the advantages of our coke; and this is being done generally throughout the country.

Replying to further questions on this subject, witness said that the stock of coke available was now much larger than formerly. As a possible reason for this, he mentioned that, owing to a new discovery in the manufacture of kilns for cement making, the use of coke, which was formerly so large in this industry, had been practically abandoned, and something like a million tons of coke thus put upon the market. In the new form of cement kiln slack was used. In connection with the general use of coke, witness handed the Committee a copy of a

recent "JOURNAL," pointing out the article illustrating the London coke-fired boiler, and concluded this part of his evidence by saying that the slow-combustion stove used for heating water was quite satisfactory, and that at the present low price of gas coke it is the cheapest apparatus for giving a continuous supply of hot water. Witness then went to the industrial uses of gas, and mentioned, among the purposes to which gas is put in this connection in Liverpool, the drying of tobacco, the drying of sausage casings and catgut, drying of bacon, taking the chill off chilled meat, and also for melting in connection with the manufacture of stereotypes and type making in the printing industry. [Already the Committee had been supplied with copies of Mr. H. M. Thornton's paper on this subject read before the British Commercial Gas Association.]

In answer to a question by Mr. BREVITT, witness said there was no application of gas to iron-works in the Liverpool district; but it was used in relation to the annealing of sheets in tin-works. A great number of coal and coke furnaces, he added, had been scrapped and gas substituted, to the betterment of the workmen and of the general public by diminishing the smoke nuisance. It was the opinion of the industry also that coke should be used as a substitute for coal for raising steam. The smoky condition of the chimneys of many corporation works was a reflection upon the technical advisers concerned. Coke was used entirely on gas-works for raising steam, and no difficulty or excessive cost had been encountered. The slump in the price of coke during the past few years should call the attention of manufacturers to the desirability of using it for steam raising—at any rate, mixed with slack. One hundred years' experience in gas-works conclusively proved that coke was suitable if used in suitable grates.

Mr. BREVITT: Do you have smokeless chimneys in connection with your boilers?

Witness: Certainly.

But not in connection with the gas-works generally?—No, because in charging or discharging retorts, especially with hand working, there is an amount of smoke, which only lasts, however, a short time.

Continuing, Mr. Allen, referring to the suggestion that the tubes of boilers suffered from the use of coke, said that a Babcock and Willcox boiler installation at Liverpool had been running from 1895 to 1910 solely on coke, and there had not been a renewal of a single tube. Further, during the last coal strike the electricity works at Bootle were kept at work by means of gas coke supplied by the Liverpool Gas Company; and arrangements were now being made to give a regular supply during the winter to these electricity works in place of slack. The Engineer to the Liverpool Corporation Electricity Works was also considering the question. It was a matter of surprise that municipal authorities having both gas and electricity undertakings should continue to use coal to generate steam at the latter works, although they had great difficulty in clearing their yards at the gas-works of coke at so low a price as even 7s. to 8s. per ton. This was a direction in which he thought the Committee might exert some influence.

The CHAIRMAN: In what form? By condemning the amount of smoke from municipal works, or by pointing out that the municipality should go to the gas-works?

Witness said he went into a certain town recently and saw the chimneys of the corporation smoking badly from the use of slack, and yet there were thousands of tons of coke at the corporation gas-works. These very same people were bothering the market in Liverpool and elsewhere by offering their coke at extremely low prices. Perhaps the reason for this was the strong feelings which sometimes existed between the two departments.

Mr. BREVITT: What would you do if the municipality owned the electricity works and not the gas-works?

Witness: Make arrangements with the gas company.

Witness went on to say that in Bergen (Norway) there is no Smoke Abatement Society, simply because they are burning coke almost exclusively. As a matter of fact, England sent many thousands of tons of coke to Norway. He himself would be sending 6000 tons this year.

Mr. BREVITT: Are all the gas companies in a similar position to supply coke?

Witness: At the present time, yes; but we cannot tell what the future may bring forth. The big coal strike cleared everybody out.

Answering Captain SANKEY, witness said that the boilers at the Liverpool Gas-Works were running continuously, and used superheated steam; separate superheaters being employed.

Witness then turned to the progress which has been made in Liverpool, where the Company were handicapped for many years from the high illuminating power gas which they had to supply under its Act of Parliament—namely, 20-candle power. In 1910, however, some relief was given by the Burner Bill, which substituted the No. 2 burner for testing. This enabled them to reduce the standard quality, and at the same time the price of gas. The price was then 2s. 6d. per 1000 cubic feet; but on June 30, 1911, it was lowered in three stages to 2s. 1d., at which figure it still remains.

The following statistics relating to the progress of the Liverpool Gas Company were handed in: From 1900 to 1910 the yearly sales have increased at an average rate of 1·45 per cent.; but during the past four years they have averaged 6·29 per cent. The general progress of the undertaking during the past ten years is set out below:—

	1903-4.		1913-14.	
Ordinary gas-meters in use . . .	64,736	..	77,977	
Prepayment meters in use . . .	34,620	..	85,004	
Total	99,356	..	162,981	
Gas-cookers on simple hire . . .	2,611	..	46,652	
Gas-fires on simple hire	0	..	7,987	(two years' work only)
Gas water-heaters on simple hire .	0	..	105	

Sales of Gas Apparatus by the Liverpool Company to the End of 1913-14.

Cookers.	438	Water-heaters	132
Fires	915	Washing boilers . . .	134
Radiators	242	Washing machines . .	30

In addition, there have been sales by private firms, of which the Company has no knowledge.

In concluding his evidence-in-chief, witness referred to the advantages of show-rooms and local exhibitions, and mentioned that at the recent Health and Home Exhibition at Liverpool more than 12,000 persons attended the gas cookery demonstrations. It was also the policy of the British Commercial Gas Association to arrange for advertisements in daily papers, magazines, and journals, and in many other ways efforts were being made to extend the business and assist in the work of purifying the atmosphere. Naturally the increased business had considerably reduced the standing charges and the cost of production. The cost of dividend and interest on capital alone during the past four years at Liverpool had dropped from 6·96d. to 5·3d. per 1000 cubic feet, equivalent to £35,000 per annum, in spite of paying more for coal and wages. The price of gas was never cheaper than to-day. There was little doubt that the effect of this policy would be to reduce the smoke nuisance. It was doing so automatically, without any action by the Committee, and he believed in time would practically abolish smoke. He thought the problems of the domestic grate would be solved with the aid of the gas industry.

Answering Captain SANKEY on the question of sending out a form of coke more in the nature of "coalite," witness said he thought the best policy was to use coal from which the maximum amount of gas could be obtained, and at the same time leave a reasonable coke. By keeping down the amount of ash in the coke to 8 or 10 per cent., a very good fuel was obtained. He agreed that the question of the quantity of coke producible bore some relation to the proportion of the coals of the country which could be used for gas making; but there were a good many such coals available.

Professor COHEN put some questions as to why the use of coke had not progressed more rapidly at Liverpool.

Witness explained that, owing to the high illuminating power standard which had been hitherto enforced upon the Liverpool Company, it had been necessary to use a proportion of cannel coal for making gas, and this contained a large amount of ash. The coke remaining was therefore of a bad quality; and it had not been felt to be good policy to put this on the market, as it would create a bad impression for the future. If the Liverpool Company's Bill got through Parliament finally, they would cease using cannel altogether, and by September the Company would be on the warpath to push their own coke.

With regard to the application of gas to the pottery industry, witness did not profess to know much about the industry; but he could not understand why gas could not be applied to it, in view of its greater ease of regulation. Probably producer gas would serve the purpose better than coal gas.

Bailie SMITH, on the question of the use of coke, mentioned an incident which happened in Glasgow in connection with the last coal strike, when the poor people could not get coal at all. In order to provide fuel, the Glasgow Corporation Gas Department sold coke at the rate of 14 lbs. for a penny, and got rid of a tremendous amount of it. But as soon as the strike was over, and coal came down to anything like 1s. per cwt, the sales of coke absolutely stopped. Here was a case, he said, in which the people were forced to try coke; but having tried it, it was not a success.

Witness, in reply to this, said he had not a very good opinion of the coke obtained from Scotch coal. It ought to have been prepared and broken. In that case very much better results would have been obtained. The Liverpool Company had made experiments in leaving in the coke more of the burnable matter. No market had, however, been obtained for this dearer coke, and therefore the sale of it had not been pursued.

Bailie SMITH also put some questions as to the fitting of gas-stoves, and the effect on the efficiency of the ventilation in this respect. Mr. Allen said that in Liverpool a complete system of inspection was maintained in connection with all hired apparatus. Their own workmen had been trained specially, because it had been found that the ordinary qualified plumber was not a qualified gas-fitter. This inspection, however, did not apply to apparatus sold outright.

With regard to Bergen, witness agreed that the closed stove was used almost universally, and that this would account for the larger sale of coke.

Bailie SMITH, commenting upon Mr. Allen's evidence as to the use of coke at electricity works, remarked that at Glasgow the electricity works, which used coal, made no smoke whatever, whereas the gas-works were very bad offenders.

Witness said this was to the credit of the electricity undertaking, although it was the exception. He could not understand why gas-works should give off smoke, except for a small amount when charging and discharging the retorts, and also when burning-out the pitchy deposit, which sometimes had to be done. If he were designing new gas-works, he could make them practically smokeless. Any works which gave smoke for a considerable time he should say were badly managed.

Mr. MACCABE questioned as to the use of coke in a Lancashire boiler. Witness, however, said he was using it in this connection quite successfully. The same member of the Committee also raised the matter of an alteration in building bye-laws in relation to cubic capacity, if a re-arrangement of the architecture could be brought about by the more extensive use of gas-fires; but witness did not presume to offer any opinions on this point.

Mr. BREVITT put to witness a number of extracts from a paper read by the late Sir George Livesey in 1905, and asked if he agreed with them. The general trend of these was in some respects contradictory to some of the views which Mr. Allen had been expressing. One remark referred to was to the effect that Sir George Livesey did not think a single gas-fire had been fixed with the object of preventing smoke.

Witness pointed out that these remarks were made many years ago, and that there had since been considerable advance, both in our ideas and in the use of the apparatus.

GAS IN THE METAL AND BISCUIT MAKING INDUSTRIES.

Mr. *Henry Lancaster* (Managing-Director and Technical Adviser to Messrs. Locke, Lancaster, and Co., and W. W. & R. Johnson and Son (an amalgamated firm), desilverers and manufacturers of lead and its products) said his firm utilized 10,000 to 12,000 tons of coal per

annum. It was impossible to avoid making smoke in the processes used. He applied two years ago to two of the leading makers of producer-gas plant in this country to supply gas for the furnaces; but they said they could not do it. The difficulty was the size and position of the pots which had to be heated. It was necessary for the flame to be all round the pot from top to bottom. The pots were made of iron, and there was great danger of gas cracking them. No other steps had been taken to go into the matter.

Bailie SMITH referred to the use of an oxidizing flame in metallurgical processes in Sheffield.

Witness said that, although this might be satisfactory with steel manufacture, he did not think it could be applied to the processes of his firm.

Mr. *Matheson* (Managing-Director of Messrs. Clarke, Nicholls, and Coombes) said that his firm used producer gas to a small extent for biscuit baking. For other purposes coke and coal were used; but coke alone could not be employed, although it was cheap now, "for certain reasons in connection with the gas industry." Coal gas would not be suitable for those purposes for which coal and coke were used. Gas-engines, however, were used.

The Committee adjourned till to-morrow (Wednesday).

A CO-PARTNERSHIP FESTIVAL.

Contentment amidst Unrest.

"Practically every co-partner has now a substantial sum of money to draw when he leaves the Company's employment from age, ill-health, slackness, or even misconduct. To face the future with a hundred pounds, or fifty pounds, or only ten pounds, is not like the common experience of the old days, and of most workmen at the present time, with only a week's wages and a few household goods to keep the wolf from the door." These words are taken from the last issue of the South Metropolitan Gas Company's "Co-Partnership Journal;" and they present, from one point of view, a very strong case for the system which was originated in the Company a quarter-of-a-century ago by the late Sir George Livesey. They explain the contented look which one is accustomed to see on the faces of those who serve this undertaking, and of those who are connected with what may be called the sister undertaking—the South Suburban Gas Company. There was ample opportunity to witness this contented look last Thursday at the Crystal Palace, for that was the day fixed for the annual co-partnership dinner given by the Directors of the South Metropolitan and South Suburban Gas Companies; the guests being the members of the Co-Partnership Committees and a number of employees selected by ballot from those who had been a certain number of years in the Company's service, and held at least £60 of stock. In all cases the wives also were invited; and it was noticed that they wore the same contented look as their husbands. This contentment, which arises from the substantial benefits accruing to the employees through co-partnership, is the strongest argument in favour of the system from the employers' point of view; for it means good service, and all the advantages that come to the undertaking therefrom. Each year that passes, it is clear, serves to strengthen the faith in co-partnership of those who work under it. All the speeches made at last Thursday's gathering go to prove this. Dinner was served in the grill room at Lyons' restaurant, and was as enjoyable as usual. In fact, even more so, for an excellent innovation on this occasion was a programme of music well rendered by the "Metrogas" band (conducted by Mr. Sydney Herbert), who were assembled on the terrace just outside the room. The chair at these functions is occupied in turn by the Chairmen of the two Companies; and this year Mr. Charles Hunt, the Chairman of the South Suburban Company, presided. He was supported by Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Company, members of the two Boards, and a number of the chief officials. After the Loyal Toast had been honoured,

THE LATE SIR GEORGE LIVESEY.

Mr. CHARLES HUNT said that, before they proceeded further, he was quite sure they would wish to do honour to the memory of him but for whom they might not have been gathered together at the Crystal Palace that day, but for whom there might have been no co-partnership at all so far as they were concerned. He referred, of course, to the late Sir George Livesey, who was the founder of co-partnership in connection with the gas industry. In the course of a long and eventful life, Sir George did a great deal for the gas industry. Those present were aware that he initiated the sliding-scale, by which the shareholders' dividend was made dependent on the price of gas. He introduced important economies in the construction of gas-works, by which much useless expenditure of capital was obviated; and he was also one of the first to foresee the coming of low-grade, or fuel, gas. These were only a few of the many things which Sir George did for the gas industry; but his crowning work, and the work for which he would long be remembered, was the securing of industrial peace by means of co-partnership. It was striking testimony to the efficacy of the system that co-partnership had secured to its followers a smooth and uneventful course, while all around in the labour world had been seething unrest. Had Sir George been spared for a few years longer, he would have greatly rejoiced at the substantial progress which had been made by the system, over the earlier years of which he watched with untiring solicitude. But he was not sure that anything would have given Sir George greater pleasure in this connection than the splendid majority by which the House of Commons, only a few nights ago, upon the Liverpool United Gas Company's Bill, had declared in favour of co-partnership—a majority which was composed of nearly all political parties in the State, and which satisfactorily vindicated the right of employees to decide what was best for themselves. He would ask those present to rise silently in their places to do honour to the memory of this great man, who though dead yet speaketh.

The request having been complied with,

A WORTHY SUCCESSOR.

Mr. HUNT said that, before calling upon Mr. Carpenter for his speech, he had to apologize for the absence of one member of the South Suburban Board—Mr. Boraston, who was detained by the present pressure in parliamentary affairs. He had also to read a telegram which had been received from Mr. Sims, formerly Co-Partnership Secretary for the South Metropolitan Gas Company. He said: "My thoughts are with my dear co-partnership friends, and I wish one and all every happiness." He would now call upon Mr. Carpenter to give them the toast of the day—"Co-Partnership." Mr. Carpenter was a very worthy successor to Sir George Livesey, whose work he had carried on in an extremely able manner. No one, in fact, could have done better than had Mr. Carpenter. During the last twelve months he had been the recipient of an honour conferred upon him by their French brethren; and upon this they heartily congratulated him.

TWENTY-FIVE YEARS' EXPERIENCE.

Mr. CHARLES CARPENTER remarked that however much he had endeavoured to promote the cause of co-partnership, he was only too well aware of the many ways in which he fell short of his illustrious predecessor. This toast had been referred to as the toast of the day; and there was no doubt that all those present were in full accord in their belief in the future of co-partnership It was as nearly as possible 25 years since he himself became a co-partner of the South Metropolitan Company; and though there were some present at this gathering whose experience of co-partnership in connection with gas supply was equivalent to his own, yet in no case did it exceed his. On the previous day, when having a word or two with one of the Company's employees, he was reminded by the workman of a fact which he did not think was generally realized. This was that the working man was usually extremely suspicious of anything proposed by an employer ostensibly for his benefit. As a rule, the first thing he did was to ask himself the question, "What is he going to get out of it?" Well, there was no doubt that this question was very keenly asked 25 years ago, when co-partnership was first proposed by (as he was then) Mr. George Livesey. The suspicion which he supposed existed to-day, as his working man friend had suggested, certainly did not exist less in that eventful year of industrial tumult, 1889. But the remarkable thing was that, although this feeling did exist, yet the large majority of artisans, mechanics, and labourers concerned accepted the proposals of Mr. Livesey with enthusiasm and delight. Those who rejected them, he feared, looked at the offer, not with their own eyes, but through the spectacles of the officials of their union. On the previous day, they had had a meeting of the South Metropolitan Co-Partnership Committee, who, he need hardly remind them, represented nearly 7000 co-partners; and he said to them: "Co-partnership has been one of the circumstances of your employment for the last 25 years, what do you think of it? Is it a fraud, or is it an honest and successful attempt to bring together in a bond of union the employer and employed? Is it wrong in its basis, or is it right?" The answer, he was glad to say, was the only answer he expected. It was unanimous; and it was the one he thought a body of co-partners could not fail to give him. Well, unfortunately, suspicion still existed to-day. The Chairman had mentioned the case of the Liverpool gas undertaking. The Gas Company—one of the largest in the kingdom—applied to Parliament for an Act to extend the scope and sphere of their undertaking. They desired powers for new works, and they wanted to make the quality of the gas supplied by them more in accordance with modern standards. The people of Liverpool, by their representatives, supported the Bill, knowing that it would be good for the city if it passed. Yet, in spite of this, the Bill was opposed in the House of Commons by representatives of every important trade union—not only unions of labourers and gas makers, but unions of skilled trades as well. It was very remarkable that this opposition was in the teeth of declarations made by the men in the employ of the Company that the co-partnership system, of which they had already had a year or two experience, benefited them in every possible way. There they had one of the difficulties which had to be contended with in pressing forward the principle of co-partnership. How they were to get over it was a very hard question indeed to answer. Each of them could do something; and there was no doubt they ought, to the best of their power and ability, to do what they could to promote what with those who had tried it had been such an unqualified success. That it had been a success, he thought there could be no possible doubt. Not only had it made better lives among those who were concerned with it, but it had been the means of making happier homes. It had improved the condition of the worker in his life and in his home, and, no less important, it had improved the employer. The effect that it had had been an educational one both for employer and employed. Now, how were they to push forward these laudable objects? He was quite sure all present—wives as well as husbands—would agree with him when he said it was greatly to be desired that co-partnership, instead of being practised as it was over the country by a few, should be the rule. The country would be very much better and more prosperous if the principles of true co-partnership could be universally extended throughout the length and breadth of the land. They should all take every opportunity that came their way of letting others see that, under co-partnership, an improvement in the relations between employer and employed had undoubtedly come about.

THE LABOUR CO-PARTNERSHIP ASSOCIATION.

Then, too, there was in existence an organization called the Labour Co-Partnership Association, which was certainly older than their own co-partnership scheme. The Association existed for the purpose of promoting co-partnership, and thank goodness it was not political. It had done good work up and down the country, by getting in touch

with those responsible for the conduct of many important industries and those engaged therein. He would like to remind those present, who had enjoyed a larger share than the average workman of the benefits of co-partnership, that membership of the Association cost as a minimum half-a-crown a year; and he would suggest that they might seriously consider the advisability of becoming members. He heartily commended it to them. There were on the management such men as Burt and Maddison, and the one aim was the furtherance of co-partnership. It seemed almost unnecessary to propose the toast "Success to Co-Partnership," because there could be no shadow of doubt as to the magnitude of this success. To take one respect only, they could look back and say: "For 25 years we have enjoyed absolute peace as between employer and employed." There must be very few industries in the country that could say as much. With the increasing knowledge of the working classes, and their growing interest in affairs of State, it was a most remarkable tribute to the genius of Sir George Livesey that, with the working men and those connected with them for the purpose of guidance in these two Companies, co-partnership stood higher in their estimation after 25 years' experience than it did when it was first started. He thought in saying this he was saying the best he could for co-partnership. In conclusion, he proposed "Success and Long Life to Co-Partnership and Co-Partnership Undertakings."

Mr. HUNT said their hearty thanks were due to Mr. Carpenter for his admirable address. He would now ask the junior Director of each Company to make a few remarks.

Mr. FRANK JONES (South Metropolitan Company) remarked that he was connected with four other companies who had followed the good example. In two cases the system had been for some time in operation; in the other two it was just starting. He hoped it would be as successful as with the two undertakings represented there that day.

Mr. B. R. GREEN (South Suburban Company) said he had been associated with gas workers all his life, and he numbered among them some of his staunchest and best friends. That these men were enjoying, like his hearers, the benefits of co-partnership, was a source of great gratification to him. As to the two Companies represented in the room, it always seemed to him that their watchword must be "Efficient service." They knew it was impossible for efficient service to obtain without the goodwill and co-operation of every member of the staff and every employee of the Company. That co-partnership promoted this goodwill and co-operation was best evidenced by the success of the companies that had adopted the principle. But co-partnership did not stop there. It provided a means of giving to the industrious worker a share in the prosperity which his energies had helped to produce, and it gave him an opportunity of acquiring stock in the company on the most favourable terms. Such community of interest could not do otherwise than create the best of feeling between employers and employed, and he was very glad to have this opportunity of again professing his faith in co-partnership.

Mr. W. DOIG GIBB (Chief Engineer of the South Metropolitan Company) stated that his belief in co-partnership was strengthened each year; that his relations with the workmen were never better than now; and that in his opinion this was due to the kindly feeling between all which had been engendered by the co-partnership principle. But he would like to emphasize what Mr. Carpenter had said. Co-partnership could not live if it was only a question of collectivism. It must be individualism. Every person must do his little bit for co-partnership, or it would never thrive. It was no use one man working hard while another was loafing about outside. They must be conscientious, and he honestly thought the men were conscientious.

Mr. S. Y. SHOUBRIDGE (Chief Engineer of the South Suburban Company) said he wished to impress on those present that they had a great responsibility towards co-partnership. They were the trustees of a great heritage which they had received from the founder, who looked to the employees of the two Companies to bring it to that full and perfect fruition of which he knew it was capable. The gas industry was leading the industrial world towards co-partnership as a panacea for the great labour troubles that were causing so much devastation throughtout this and other countries. It behoved them all to show what the system could do when worked under proper conditions. There was some danger that the regularity with which they received their bonus, and the increasing value of it, might tempt them to regard the system as automatic in its action. There could be no greater mistake. Co-partnership could only succeed by the most loyal and hearty efforts of everyone who received the benefits of it. He asked all to strive their hardest to secure even more success and give greater and increasing honour to its founder.

SOME FIGURES.

Mr. F. M'LEOD (Secretary of the South Metropolitan Company), speaking for his Company, said the co-partners present that day owned in stock £32,400; and not one of them held less than £60. These were very impressive figures. Let them compare this with the condition of affairs which obtained elsewhere. The Government returns relating to trade disputes for the six months ended June 30 last showed that in that period 7,763,000 working days were lost, which probably represented over £2,000,000 lost in wages. Contrast this with the present gathering—200 men holding over £32,000 of stock, besides enjoying benefits in other ways. It was up against them all to go and spread the light.

Mr. W. WASTELL (Secretary of the South Suburban Company) remarked that so far as the co-partners of his Company were concerned, they held in the undertaking no less than £52,800 of stock. This stock was their very own, and was unassailable. The bonus had risen in the last six years from £2400 to £6300. They were all proud to know that they belonged to one of the greatest industries in the world—an industry which he believed was just emerging from youth to vigorous manhood, though it was something over a hundred years old. But he did think there were strenuous days ahead for this great industry; and they would need all their loyalty to help it to weather the storms in front of it. It was necessary for each to unselfishly and unswervingly apply himself to the principles underlying co-partnership.

VOTES OF THANKS.

Mr. F. E. ELDRIDGE (South Metropolitan Company), in proposing a vote of thanks to the Chairman and Directors of both Companies for their generosity, said the occasion was one which was much looked forward to. As a working man, he firmly believed that if co-partnership principles were rightly appreciated and loyally acted upon—this was very important—they must of necessity enhance the welfare of all concerned. He wished both Companies a most prosperous year's business.

Mr. CARTER (South Suburban Company) seconded, and also expressed thanks to the Chairman for presiding. Mr. Hunt, he remarked, had afforded many proofs of his lively interest in the co-partnership scheme, and in everything that affected the well being of employees of the Company. He had shown unfailing kindness, consideration, and courtesy to him (the speaker) and all other co partners who had consulted him with reference to any matter touching the welfare of the men. The Co-Partnership Committee had brought the employees into close personal touch with the Board, with the result that goodwill and loyalty of service were fostered. They were all gratified that the rate of bonus just declared had been maintained at its previous high level. The employees would earnestly endeavour not only to earn the bonus, but to increase it. There was another matter they had to thank the Directors for. Since they met there last year, the South Suburban Company had extended to almost all sections of the employees the 48-hour week. In taking this step they were following the example of the South Metropolitan Gas Company. In conclusion, he offered the congratulations of the employees to Mr. Carpenter on the medal with which he had been decorated in France for his efforts towards industrial peace.

Mr. G. F. MAY (South Metropolitan Company) and Mr. W. T. LUTHER (South Suburban Company) supported the vote. The latter speaker said that for the South Suburban Company this was the twenty-first bonus; and the amount of stock held by the men was very satisfactory.

The vote to the Chairmen and Directors and to Mr. Hunt for presiding having been carried with applause,

Mr. HUNT, in acknowledgment, said he hoped to be present at future similar gatherings.

The party then separated, and later on, after a pleasant afternoon in the grounds, returned to the restaurant for tea.

EUROPEAN GAS COMPANY, LIMITED.

Retirement from the Chair of Mr. R. Hesketh Jones—A Good Increase in Business.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. W. B. Brady) read the notice calling the meeting and the Directors' report and the accounts. The report was as follows:

The Directors are able to report a continued improvement in the Company's business. There has been a general increase in the sale of gas at all the stations; and the total rental shows an advance of 5½ per cent.—6824 new consumers having been obtained during the year. The returns from coke and tar have also been more satisfactory; but sulphate shows a considerable reduction.

In common, however, with other gas undertakings, the Company has felt the effect of dearer coal and higher freights; but contracts for the current year have been made on more favourable terms.

The average length of the Company's concessions is now 27 years.

The Stock Exchange values of the investments on the Company's balance-sheet show an improvement as compared with the figures on March 31, 1913; and the Company has still a reserve of £12,219, available for the depreciation of securities, which meets the Stock Exchange values within £2992.

Owing to the extension of the Company's business at Nantes, the Directors have thought it desirable to acquire a considerable plot of land there with river frontage.

The efficiency of the manufacturing and distributing plant at the several stations has been fully maintained.

The accounts for the financial year under review have had to bear the expense of the strike at Nantes (to which reference was made in the last report); and this, with the increase in the cost of coal, has reduced the profits below the amount required to pay the usual dividend, by the sum of £2247. The Directors recommend that the sum be taken from the general revenue account, and that the same dividend as in previous years be paid—viz., 20s. per share, free of income-tax (of which 10s. per share was paid on Jan. 31 last).

The Directors who retire by rotation are Robert Hesketh Jones, Esq., and Henry E. Jones, Esq., M.Inst.C.E.; and the retiring Auditors are J. Reeson, Esq., and H. J. Luff, Esq., who, being eligible for re-election, offer themselves accordingly.

The CHAIRMAN said it was with some little feeling of unfitness that he rose to address the shareholders that day, in place of the revered and honoured gentleman who sat at his right-hand side—Mr. R. Hesketh Jones. But he knew that he could claim indulgence for any shortcomings; for it was extremely difficult for an amateur to make a speech when he knew that a master in the art of conducting public meetings was sitting as a looker-on, instead of himself conducting the business. His respected predecessor in the chair had been so kind as to come there that day, to hear him (the Chairman) address the shareholders on behalf of the Directors whom he (Mr. Hesketh Jones) so worthily and so fully represented in the chair for so long. He owed Mr. Hesketh Jones a little grudge for having retired from the chair, though he should felicitate him probably on having taken a step which protected him, to some extent, from the troubles and labours which beset the Chairman of a Company who had such an energetic coadjutor as Mr. Williams, and who had to open a good many letters in the course of a week, and have to take part in a good many conferences. If Mr. Hesketh Jones had taken the step in respect of his own comfort and health, they congratulated him. But, in doing so, he had done him (the Chairman) an injury; for he had converted what was to him a comfortable sinecure into a position of responsibility and of, to a certain

extent, labour. [Laughter.] However, they were glad to have him with them that day, and hoped they would see him with them for a good many years to come. Although not related, he had many feelings akin to his (the Chairman's) own. They pursued very much the same ideas; and he daresay Mr. Hesketh Jones felt, on leaving the chair, that he could perhaps trust someone whose general views were very much the same as his own. He (the Chairman) could say, in all gratitude, that he had received, both before and since their friend had left the chair, his generous and kindly support; and, in fact, he had behaved to him in this Company as an elder brother, and so had won his affectionate regard.

Now he had to deal with the report. The shareholders would be gratified to see there was a satisfactory increase of business throughout the whole of the towns supplied by the Company—averaging 5½ per cent. Then they had added to the number of their consumers 6824 new ones. These were very gratifying facts, because, as long as the Company continued to advance, so long could they introduce further economies in the constructional work necessary to meet the growth of business. The year had been marked by a considerable increase in the cost of coal. The amount spent on coal must, of course, have advanced considerably owing to the 5½ per cent. extra business done; but, when he told the shareholders that it had advanced by something like £12,000 beyond, they would realize there had had to be a good deal of economy and painstaking work to bring out the successful results now laid before them. The returns from coke and tar were higher than in the preceding year; but they did not bring them in 5½ per cent. more, as prices had been lower. Sulphate of ammonia particularly had shown a reduction of price; but, he was happy to say, it was now somewhat recovering.

The report reminded them that the Stock Exchange values of the securities in which they had invested money had been showing an improvement in the past year. There was very little doubt that the small balance between these values and the sum on the balance-sheet would never be required. Owing to the extension of business at Nantes, the Directors had deemed it prudent to acquire a considerable area of land with a frontage (to which large vessels with coal and other material could be brought) on the River Loire.

The year's accounts, the report informed the shareholders, covered, besides the extra cost of coal, the expenses of the strike at Nantes. The Board reported to the shareholders last year that the cost of the strike could not then be ascertained; and the cost had fallen upon the present year. But he was glad to say that, owing to the improvements that had been effected and brought into operation at the various stations, in both the manufacturing and distributing plant, economies had been made possible, and had been accomplished; and these had gone far to neutralize the loss brought about by the extra cost of coal and the strike. Therefore, when the balance had to be struck, the Board found they need only go to the reserve for the small sum of £2247 to enable them to recommend the full dividends. Last year there was a small balance of £311; and had it not been for this, the deficit would have been £2558. The Directors, therefore, recommended that the dividend be paid of 20s. per share, free of income-tax, of which half was paid in January last. He always said, at any meeting at which he occupied the chair, that profits were not made unless they were arrived at after making full allowance for the wear and tear and upkeep of the undertaking. He was happy to tell the shareholders that—despite the cost of the strike and the advance in the price of coal, and (contrary to the general experience when there was an advance in the fuel market) with lower prices for coke—the Board had been able to spend on repairs and renewals within £1600 of the sum expended in that direction in the fattest year in recent experience. With the upkeep, a great feature of the Company was a small share capital account and a low charge for dividend; and a consequence of this was they could sell gas cheaply. The prices at which they sold gas were low, and compared very favourably with any in Europe. This was a feature they owed to his predecessor in the chair (Mr. Hesketh Jones), and he might say still more, through many prior years, to the management of Mr. M'Lauchlan Backler, who, over a long period, zealously guarded the advance of the Company and assured its development on very stable financial lines, and who trained for them their present Managing-Director (Mr. W. Williams), who took care that the old policy was pursued. It was the policy which had enabled the Company to look forward with confidence, and to undertake concessions on terms favourable to the consumers, and at the same time satisfactory to their interests as shareholders. He had much pleasure in moving the adoption of the report and the accounts.

Mr. R. Hesketh Jones seconded the motion, which was unanimously carried.

Moved by the Chairman, and seconded by the Deputy-Chairman (Mr. R. S. Gardiner), the interim dividend of 10s. per share, free of income-tax, less 6d. per share for duty in respect of shares held in France, was confirmed, and a final dividend of similar amount and on similar terms was also declared.

The Deputy-Chairman seconded the motion, which was unanimously agreed to.

The Chairman then moved the re-election of Mr. R. Hesketh Jones as a Director, and, in doing so, spoke of the care and diligence with which he discharged the duties of the office, just as he had formerly discharged those of Chairman.

The Deputy-Chairman, with great pleasure, seconded the motion; and it was enthusiastically carried.

Mr. Hesketh Jones (who, on rising, was heartily greeted) said he had some difficulty in addressing the shareholders after the very kind remarks the Chairman had made, and the shareholders' endorsement, as to his conduct during the time he had been a Director and the Chairman of the Company. It was with great regret that he was forced by circumstances over which he had no control to resign his position as Chairman. His health was giving way; and he felt that, at the age of just upon 87 years, it was time for him to retire from the onerous duties of the chairmanship of a Company like this. It was at the urgent request of his colleagues that he had consented to place his name before the shareholders for re-election as a Director; and in full confidence, he could say that, if he was spared, no exertion on his part would be wanting to perform the duties which he recognized naturally and properly adhered to the office of a Director. His colleagues were exceedingly kind to him; and he was sure that, if occasionally during the coming winter he was unable to be present at the Board meetings, they would excuse him. He had, however, very great pleasure in accepting the office, as a mark of the approbation of the shareholders of his efforts on behalf of the Company in the past. He had now the satisfaction of proposing the re-election of his esteemed friend and namesake, the Chairman. Although not related by blood, they were related as associates in administrative work in the gas industry. Holding very much the same views, they had no difficulty whatever in arriving, at the Board meetings, at fair and definite conclusions in the interests of the Company; and the shareholders, he knew from experience, could not do better than re-elect one who held such a position in the gas industry as Mr. H. E. Jones.

Mr. H. C. Smith seconded the motion, which was heartily carried.

The Chairman having acknowledged his re-election,

On the proposition of Mr. J. G. Overbury, seconded by Mr. H. D. Ellis, the Auditors (Mr. Joseph Reeson and Mr. H. J. Luff) were re-appointed.

Mr. Reeson having responded on behalf of himself and his colleague,

The Chairman said he was sure the shareholders would not like to separate without recording their sense of satisfaction and obligation, as well as their best thanks, to their officers and staffs in London and abroad, as well as to their workmen at the various stations, for their services. Abroad and in London, the Company were most efficiently served and represented. The policy of the Board had always been a liberal one with regard to their officers. In selecting them, they always took care, in view of the onerous and responsible duties they had to discharge, for them to have men who were accomplished linguists and well qualified technically; and then to treat them with the greatest possible indulgence and respect. This policy had been rewarded by the drawing together of a staff of the highest and the best *personnel*. They had at their stations men who paid the greatest attention to the minutiæ of economy; and, under their management, not the smallest product was neglected or wasted. This commended itself to his (the Chairman's) admiration, familiar as he was with the best of such services as were rendered in this country. As to the working men, they had shown themselves very well contented with the liberal system of bonus arrangements and provision for sickness and old age, which system was worked out under Mr. Hesketh Jones a year or two ago. The men appeared to have gratefully responded to the scheme by the most intelligent performance of their duties.

Mr. R. S. Gardiner, in seconding the motion, said that, having lately visited some of the Company's stations, he was able to say that the thought uppermost in his mind as he left each station was one of absolute confidence in the industry, tact, and wisdom of each of their Managers. Situated as the stations were at a distance from the head office, and with all the characteristics of a foreign country to study, he could assure the shareholders that, so long as the management of their stations was in the hands of men who were as capable and as wise and devoted to the interests of the Company as those with whom he had recently had the pleasure of spending many hours, so long, he was convinced, would the prosperity of the Company continue.

Mr. W. Williams (Managing Director) said, on behalf of the officers and men abroad and of the London staff, he thanked the shareholders for the kind recognition of their services. They all, not only in London, but abroad, did their best to further the interests of the Company. Nearly all of them had now been connected with the Company for a considerable period; and therefore they felt a genuine interest in its business.

Mr. H. D. Ellis, in moving a vote of thanks to the Chairman and Directors, spoke of the constant increase in the labours and anxieties of the members of gas directorates, owing particularly to the uncertainty of markets and other things. He also alluded to the retirement from the chair of their old and esteemed friend, Mr. Hesketh Jones, with whom he had the pleasure of sitting on a Board, in another place, for many years. Therefore, he knew well the energy, the devotion to duty, the keenness, and the great ability with which Mr. Jones devoted himself to every detail of the business as if it was his own personal concern. He could not have put himself to more trouble or pains in carrying out his duties. He was indeed an admirable Director. With regard to the successor to the chair—his (Mr. Ellis's) old friend, Mr. H. E. Jones, with whom he had been associated in the gas industry for some 35 years—he still looked upon him as one of the young lions; for in addition to all that broad experience which only came with mature age, he still had the keenness, alertness, energy, and enthusiasm of youth. Mr. Jones seemed to have solved the problem of almost perpetual youth. He congratulated him on having come to the chair; he congratulated the Company upon having a man in the chair who was so thoroughly acquainted with gas matters.

Mr. J. Reeson, in seconding, remarked that with regard to the change of Chairman, there were only two feelings upon the shareholders—one was extreme regret at the loss of Mr. Hesketh Jones as Chairman, and the other was satisfaction at, and appreciation of, the choice made by the Directors of his successor.

The Chairman acknowledged the vote; and Mr. Hesketh Jones thanked Mr. Ellis for his kind remarks concerning him.

Camborne Electric Light Failures.—There has lately been another failure of the electric light in Camborne; one of the main thoroughfares of the mining capital of the Duchy being entirely without current during the whole of the evening. It was on a Saturday; and this being the weekly market-day, a number of shopkeepers sustained serious loss of business, their premises being in utter darkness save for a glimmering light from a number of wax candles—a truly grotesque and sorry spectacle. Fortunately, the majority of shops are lit with gas; and a number of the tradesmen who have electric installations also possess gas-lamps (having been taught a lesson on previous occasions), which saved the situation. It is an ill-wind that does not blow good for some one; and the local Gas Company have since the occurrence received several orders for additional gas-lamps.

TOTTENHAM LIGHT, HEAT, AND POWER COMPANY.

Half-Yearly Report and Accounts.

In the report to be presented by the Directors of the Tottenham Company at the half-yearly meeting on the 8th prox., they state that the accounts for the six months ended the 30th of June show that, after providing for interest charges, there remains a profit balance of £20,224. Adding the amount brought forward from the previous half year—£51,629—and deducting the sums required for compensation to the Enfield Directors and officers and for the redemption of capital in accordance with the provisions of the Company's Act of last year (together £9012), the sum available for distribution is £62,840. The Directors recommend payment of the 5 per cent. per annum dividend on the preference stock, and of the full statutory dividends of 7½ per cent. per annum on the "A" stock, and 6 per cent per annum on the "B" stock. This will absorb £25,007, and leave £37,833 to be carried forward. The amalgamation of the Enfield Gas Company with the Tottenham Company having taken place on the 1st of January last, the accounts of that Company are included in those to be submitted at the forthcoming meeting. The sales of gas show an increase of 5·69 per cent. compared with those of the combined Companies for the corresponding six months of 1913. The consumers now number 77,890; and there are 51,567 cooking and heating stoves in use.

The statements relating to the working of the Company show that, under the supervision of the Chief Engineer and General Manager (Mr. A. E. Broadberry, M.Inst.C.E), 70,329 tons of coal were carbonized and 709,669 gallons of enriching oil used in the past half year. The make of gas was 1,348,974,000 cubic feet, of which 1,162,347,000 cubic feet were sold and 1,188,369,000 cubic feet accounted for. The estimated production of residuals was: Coke, 43,666 tons; breeze, 7051 chaldrons; tar, 710,511 gallons; and ammoniacal liquor, 31,252 butts. The quantity of sulphate of ammonia made was 759 tons.

VIEWS ON MUNICIPAL TRADING.

Some Remarks at the International Municipal Conference.

At the International Municipal Conference last week at the Anglo-American Exposition, Shepherd's Bush, the subject of municipal trading was dealt with on Thursday in relation to the supply of gas, electricity, and water, and views were exchanged between the delegates from American cities and various mayors and officials of English boroughs. The Hon. D. C. FLETCHER (Senator, U.S.A.) presided.

Alderman JABEZ WILLIAMS, J.P. (Mayor of the Metropolitan Borough of Lambeth) said that Lambeth did not go in for municipal trading, as it was felt that it interfered with private enterprise. With regard to electricity, he did not think the London boroughs which had taken up the supply of this were very satisfied so far as the question of profit was concerned. People liked this method of lighting, of course; but it was rather an expensive luxury. Gas, however, had been improved to such an extent that some of the boroughs preferred it, and found it better and less expensive than electricity.

Professor A. R. HATTON (Cleveland, Chicago) said that in America municipal trading had not been carried so far as in England, and the authorities had not been very willing to promote the practice because of the very strong sentiment for individuality in that country. There were, however, advocates of municipal trading there; but the general feeling among them was that municipal undertakings should stand on their own bases, although there should be no attempt to make profit in order to reduce the rates. In his city the electricity undertaking was being rapidly municipalized, and other attempts were being made in New York and Chicago; but these were regarded as more or less experimental. He anticipated, however, there would be a tremendous spurt in this direction in America during the next few years.

The CHAIRMAN expressed the opinion that with municipal trading the ratepayers would get better lighting, better water, and cheaper rates.

The HON. W. E. SAUNDERS (Washington), in answer to a question by Mr. W. A. Richards (National United Temperance Council), said there were smoke abatement regulations in Washington, and punishments in the form of fines were inflicted.

Mr. C. C. GRAHAM (Mayor of Scarborough) said that the water undertaking in Scarborough was carried on satisfactorily by the Local Authority. He thought it a very good thing that the water supply, which was an absolute necessity, should be under public control; but if carried on by a company, they should be made to conform to the public interests. With regard to gas and electricity, these were not absolutely necessary, although very important; but it could be well argued that to place the supply in the hands of the municipality would be to interfere with private enterprise. The gas and electricity undertakings in Scarborough were run by private concerns. The gas was supplied at the very moderate price of 2s. per 1000 cubic feet; and it was extremely doubtful whether a municipality could improve on this, having regard to the quality of the gas supplied.

Mr. HENRY RHODES BROWN (Lord Mayor of York) expressed himself as an individualist, and opposed to municipal trading, and maintained that in dealing with a private company a person obtained better value for less money than when dealing with a municipality. Some time ago the York Corporation attempted to purchase the gas-works, which were carried on by a Company, but he himself had hindered this, with the result that the undertaking was not transferred. Since last year the Gas Company had reduced the price of gas from 2s. 2d. to 2s. 1d. per 1000 cubic feet, and, owing to competition between the gas and electricity undertakings, the price of electricity had had to be reduced from 5d. per unit to 3½d. The electricity undertaking was owned by the Corporation; and if the city had spent £500,000 on an obsolete gas plant the price of gas and electricity would have been the same now as last year. The danger of municipal trading was also manifest at election times. Municipal employees were always out for more wages, and therefore there was the danger of the municipalities pandering to the employees. Where municipalities owned trading concerns, and earned good profits from them, the rates were almost invariably high. He contended that the province of a city was to rule and govern, and not to trade.

Mr. JOHN A. RUSH (Denver, Colo.) asked how the rates could be higher when municipalities were earning large profits from their trading concerns.

Mr. BROWN said that there were items which should be charged to these concerns, but which were not.

The meeting was then adjourned.

CHELMSFORD CORPORATION AND THE GAS-WORKS.

Decision to Purchase.

The Chelmsford Town Council held a special meeting on Monday last week to consider the question of applying to Parliament for power to acquire the undertaking of the Chelmsford Gas Company, in accordance with clause 91 of the Company's Bill, which has passed both Houses of Parliament. The matter had been under discussion at a private meeting on the 15th inst., when the Council had before them a report by Mr. E. Herbert Stevenson, who was present to offer any explanations required.

Mr. Stevenson first dealt with the history and position of the Company, and mentioned that they had authority to issue £22,325 of share capital bearing 10 per cent. dividend, and £20,000 bearing 7 per cent. The Company would shortly obtain the Royal Assent to their Bill authorizing the conversion and consolidation of this capital into £72,650 of stock bearing a 5 per cent. standard dividend, and the raising of £54,000 of share and £31,700 of loan capital. A scheme of radical reconstruction of the works will, Mr. Stevenson thinks, be necessary in the near future—partly because the undertaking is growing so rapidly that the existing retorts will not be of sufficient capacity in a short time, and partly because the settings are not modern; and the improved results of modern settings will repay the cost in a very few years. The financial and general position of the Company are exceedingly good. While for many years they have been earning and paying the maximum dividends allowed, they have also largely used their revenue for extending their business. The total amount spent upon the repairs and maintenance of the undertaking, including fittings on hire, amounted last year to 10 63d. per 1000 cubic feet of gas sold. Mr. Stevenson pointed out that local authorities do not need to set aside any sums for depreciation, because the sinking fund which is obligatory upon them takes the place of depreciation, and redeems the capital employed within the period allotted to the loan. In these circumstances, therefore, if the Corporation exercised their powers and acquired the gas undertaking, they would not have to spend for repairs and renewals of the works and distributing apparatus, and possibly some capital expenditure, more than 6d. per 1000 cubic feet of gas sold; and there would thus be a saving effected (on the statement of the working of the Company for 1913) of a sum equal to at least 4·63d. per 1000 cubic feet, which would amount to £1542 17s. There would further be at least the following items of cost saved if the undertaking were transferred—viz, Directors' fees, £200; salary of Secretary, £250; Auditors' fees, £28 7s.; or a total of £483 7s.

It might, he said, well be expected that, on the average of years, the net cost of coal would be at least 1d. per 1000 cubic feet less than in the year 1913, or £333 4s. 7d. a year. Adding these items to the profit shown by the balance-sheet for 1913—£4688 12s.—gave the sum of £7048 0s. 7d. as the figure which would represent the profit to the Corporation if the works had been in their hands. In view of the rapid growth of the undertaking during recent years, Mr. Stevenson calculated that, on an increase of 8 per cent. per annum in the quantity of gas sold—which was less than any of the last three years—the first year's profit obtainable by the Corporation, which would probably be for the period ending March 31, 1917, would amount to not less than £8800 or £9000. Dealing with the terms of the option to purchase as contained in the Company's Bill, Mr. Stevenson described them as perfectly reasonable. The question as to whether the Corporation should exercise the option and acquire the undertaking he answered at once in the affirmative.

Mr. Stevenson then proceeded to deal exhaustively with the question of the present value of the Company's undertaking and the price the Corporation would be required to pay for it. He pointed out that he desired to take the worst view, from the Corporation standpoint, of what might be required of them, and that the figures he submitted did not represent his definite opinion of what the Company might be awarded in the event of arbitration, but what he considered was the utmost they were likely to obtain. His conclusions briefly were as follows: Assuming the Company would be able to show that they could reduce the price of gas by 3d. per 1000 cubic feet and pay a dividend of £5 7s. 6d. upon the capital stock representing the existing share capital (£72,650), the amount of divisible profit would be £3905. And assuming, also, an award equal to 22 years' purchase of this sum, this would give £85,910. The Corporation would also have to pay an additional sum, representing a mortgage, of £10,500. To this would probably be added a sum equal to 2½ per cent. on the amount of £85,910, this representing an allowance for compulsory purchase and reinvestment and the lying-out of interest for a short time, which would bring the total value of the undertaking to £98,558. Other suggested items of expenditure, in addition to the foregoing, were: The costs of the Act of the Company; any costs of the Company in obtaining amendments to the Bill introduced by the Corporation; and £200 in respect of the transfer of the undertaking and the winding-up of the Company—altogether, £2000. Compensation to Directors (five years' purchase of their annual fees of £200), £1000; do. to Secretary (seven years' purchase of his salary of £250), £1750; do. to Engineer

(seven years' purchase of his estimated salary of £400), £2800. These items made an estimated total expenditure of £104,108.

An unopposed Act of Parliament would cost £500 or £600, which would have to be paid off in five years. Taking a 30 years' period for repayment, Mr. Stevenson put the total amount of loan and interest for the purchase, compensation, and arbitration expenses at £110,000. He calculated the annual repayments at £6332 for the first five years (this included the cost of the Act), and £6200 for the remaining 25 years. If, as he expected, 35 years were allowed for the repayment of the large loan, the annual payment for the first five years would be £5925, and for the remainder £5793. He asked the Corporation and the ratepayers to bear in mind that nearly one-third of the amount of the annual payments was in respect of the sinking fund, which redeemed the capital sum at the end of the period of the loan.

Dealing with the financial result to the Town Council in the event of their purchasing the undertaking, Mr. Stevenson estimated a surplus profit, if the same price were charged for gas, of about £2500 a year. On the question generally, he said it appeared to him that the Corporation had an opportunity for permanently benefiting the borough, which, if let slip, would never recur. He also pointed out how very successful municipally-owned gas-works have been in the past and are at the present time. Having been engaged in most transfers of gas undertakings during the last thirty years, he said he did not think he knew any case in which the certainty of surplus profit on the undertaking as it stood, or the possibilities of future profit, were so assured as in the case of Chelmsford. He concluded by saying that, taking into consideration all the circumstances of the case, he could not urge upon the Corporation and their constituents too strongly the advisability of exercising the option of purchase conferred upon them by the new Act of the Company; and he was certain the town would never regret having adopted this advice.

The MAYOR (Alderman G. W. Taylor), who presided, said that the question before the Council was: Were they satisfied with the answers given by Mr. Stevenson at the previous meeting.

The TOWN CLERK (Mr. G. Melvin) said Mr. Stevenson had reiterated the opinion expressed in his report that the Corporation would be well advised to take steps to acquire the Company's undertaking. He added that unless they promoted a Bill next session they would not have another chance of going to Parliament for power to purchase unless the Company at some remote date applied for another Bill after they had exhausted the powers they now possessed.

After some conversation, in the course of which explanations were given by the Town Clerk and Mr. Stevenson,

Mr. A. R. P. HICKLEY moved that the requisite steps be taken to promote next session a Bill to enable the Corporation to purchase the Gas Company's undertaking.

Mr. F. COLLINS seconded the motion.

Mr. BAKER supported it, and stated that a meeting of working men had passed a resolution asking the Council to acquire the gas-works; and Mr. Hickley and he had made this the chief subject of their election speeches in November.

The MAYOR, speaking as Chairman of the Finance Committee, urged the Council, as business men and custodians of the public purse, not to let the present excellent opportunity of purchasing the gas undertaking slip by. He could not for a moment think the works would in the future pay less than they had done in the past. He hoped the resolution would be carried by a considerable majority; and he would then have no hesitation in saying that when they went to the public they would present a case on business lines, and would be fostering one of the most beneficent acts the Corporation had ever carried out.

The motion was then carried unanimously, and a Committee was appointed to deal with the whole subject.

GAS MANAGEMENT IN THE POTTERIES.

At the Monthly Meeting of the Stoke-upon-Trent Corporation held last week-end, the Gas Committee reported that they had considered the resolution of the Council deferring the appointment of a Chief Engineer and Assistant-Engineer till the Sub-Committee had reported on the question of combining the four municipal undertakings—Longton, Fenton, Burslem, and Stoke—and they re-affirmed their previous decisions upon the subject to the effect—"That the gas undertakings of the borough be placed under the control of a Chief Engineer; that Mr. W. Langford, the Engineer of the Longton Gas-Works, be appointed Chief Engineer and Manager of the Corporation gas undertakings; that Mr. Robert Surtees be appointed Chief Assistant to the Gas Engineer of the Corporation, and Resident Engineer of the Burslem works; that Mr. W. Langford immediately take over the control of the various works, and that he prepare and submit forthwith, to the Committee, a report upon the advisability or otherwise of combining the undertakings; that the salary of the Chief Engineer be fixed at the annual sum of £700; and that the salary of the Chief Assistant Engineer be as heretofore."

Alderman MITCHELL moved the adoption of these minutes; stating that the Committee, after careful consideration, could only repeat their previous recommendation as to the management of the works.

Alderman F. GEEN (the Deputy-Mayor), who had taken the chair in the absence of the Mayor (Alderman P. Elliott, J.P.), pointed out that at the last meeting of the Council it was resolved that the appointment of a Chief Engineer be deferred until the Committee had reported on the question of combining the undertakings. Until such a report had been received, therefore, the Council could not make any appointment, and he should rule the minutes out of order, with the exception of the clause which recommended that Mr. Langford should immediately take control of the different works. To this clause he would move, as an amendment—"That, pending the appointment of a Chief Engineer, Mr. W. Langford take over the control of the various works; and that he prepare and submit forthwith to the Committee a report on the advisability or otherwise of combining the undertakings, in accordance with section 18 of the Federation Act." He moved this, he said, for the reason that the Manager of the Stoke Gas-Works would have left by September, and Mr. Surtees would be at Burslem more or less the whole of his time; and it was necessary that there should be some control. His suggestion was that Mr. Langford, pending the apointment of a Chief Engineer—it might be himself—should take over control, and prepare a report on the linking-up of the works.

Alderman SHENTON (the Vice-Chairman of the Gas Committee) said the object of the Committee was to have someone in control by the time Mr. Prince left.

Mr. BAYLEY thought it was hardly fair to Mr. Langford to ask him to do this work when the question of the appointment was in abeyance.

Mr. HULSE also thought it was not fair to Mr. Langford.

The amendment was, however, carried.

TEMPORARY CHIEF-ENGINEER APPOINTED.

The *raison d'être* for these proposals is, says our Correspondent, that following the death of Mr. E. Jones, who had charge of the Burslem works, the Corporation endeavoured to see what economies could be made in the management of the four municipal gas-works. The recommendation of the Gas Committee was that Mr. Langford (the Manager at Longton) should be made Chief Engineer, Mr. Surtees (the Manager at Fenton) Assistant-Engineer, and the Manager at Stoke be compensated. The Council, however, two months ago, referred the appointments back largely, it was thought, because the Gas Committee did not take their colleagues sufficiently into their confidence. The same recommendations were forthcoming at the last meeting of the Committee; and on that occasion Alderman Geen was instrumental in getting the appointments deferred, pending a report on the advisability of the linking-up of the four works. Last week-end, therefore, when the Gas Committee reiterated their recommendations, Alderman Geen, who was in the chair, ruled that they were out of order, and that, in view of last month's decision, no appointments could be made until the receipt of the report. As will be seen, however, it was decided to temporarily place Mr. Langford in charge.

One of the leading papers in the Potteries states that "the difference between Alderman Geen and the Gas Committee seems to be largely on a matter of procedure. The Alderman wishes to first adopt a scheme for the management of the works and then appoint officials accordingly. On the other hand, the Gas Committee, feeling they have got in their service an Engineer who is capable of getting the best out of the works, desire to place him in charge at the earliest possible moment and to give him full scope." Yet another comment runs: "Those who are acquainted with the history of the Longton works know that Mr. Langford has made a reputation there; and few will dispute his excellent qualifications for the position for which he was proposed."

MOND GAS AND BYE-PRODUCT RECOVERY AT A CENTRAL ELECTRICITY STATION.

Some useful figures are to be found in the report for the year ended March last of Mr. Harold Gray, the Borough Electrical Engineer at Accrington, with reference to the generation there of electrical energy by the use of gas-engines, the making of Mond gas, and the recovery of sulphate of ammonia.

The production of electrical energy was during the year carried out by a combination of steam-engine driven direct-current generation and gas-driven high-tension alternators; transformation from one system to the other being dealt with by motor converters. The gas plant has as much as possible been applied to the handling of the steady day and night load; the steam plant dealing mostly with the irregular peaks. The former plant has been under excessive duty. The gas-producers have never had their fires out; and both gas-engines have been running daily, and one all night and on Sundays. The units supplied to consumers from the gas plant were 4,099,221, and from the steam plant 1,756,809. The fuel consumption on the gas plant was 5443 tons, at an average of 13s. 10d., £3765 (0·220d. per unit); and on the steam plant 4309 tons, at an average of 13s. 10d., £2980, and 12,259 tons refuse at an average of 11d., £562 (0·483d. per unit).

With regard to bye-product recovery, the tar has been sold to a local refiner, and there is very little profit in it, as it is troublesome to collect and handle. The sulphate made during the year was 149 tons, which at an average price of £11 6s. 2d. per ton equalled £1685; and the tar collected was 356 tons, which at an average price of 10s per ton equalled £178. The wages on this plant during the year were £234, and the acid used in the manufacture of sulphate cost £302, leaving a bye-product profit of £1327, being 0·077d. per gas unit. The units produced by the gas plant cost 0·415d. per unit sold, or 0·338d. after deducting the bye-product profit (0·077d.); and the units produced by the steam plant 0·762d. The average for both plants was 0·466d. per unit.

The following reference to the report is made in their editorial columns by the "Electrical Review:" "Some five years ago, when Messrs. Andrews and Porter read their paper on large gas-engines before the Institution of Electrical Engineers, the growing use of the internal combustion engine was 'the question of the day.' But the answer was apparently in the negative, for little has been done in this country in the direction of adopting large gas-engines in central station practice since that date. There is, however, one striking exception—namely, the Accrington Corporation—which, on the advice of its Engineer (Mr. Harold Gray), put down producer-gas plant with bye-product recovery, and two 1000 H.P. gas-engines and generators, in addition to its existing steam plant.

"It may be remembered that the authors of the paper mentioned regarded 2000 H.P. as the limit below which bye-product recovery could not be carried on profitably—and not even at that figure unless the load factor was exceptionally good. They suggested that, where the gas plant was added to an existing steam plant, the former should be run continuously, and the latter should be employed by the peak loads, thus taking advantage to the utmost of the fuel economy of the gas-engine, and the elasticity of the steam plant. Mr. Gray has run his

plant somewhat on these lines. The producers have never been shut down, and both engines have been running daily, and one all night—a fact which reflects great credit upon the engine builders, and not less upon Mr. Gray and his staff, for who expects a large gas-engine to run continuously throughout the year? The result has been a sale of over 4 million units generated by the gas plant, and 1¾ millions by steam. Using ordinary coal, for the most part, in the producers, the cost of fuel has worked out at 0·220d. per unit for gas and 0·483d. for steam; the average price per ton of coal being in both cases 13s. 10d. The wages are high, because the gas plant is small; but it is being doubled in size, without requiring a larger staff. They work out at 0·126d. for gas, and 0·200d. for steam.

"Mr. Gray regards tar with little favour. It is troublesome to deal with, and brings in little profit; but it has to be got rid of. The sulphate of ammonia, on the other hand, pays for more than half the cost of the fuel; and although the recovery plant was in operation for only 38 weeks—having been started at the end of June, 1913—it returned a profit of 0·077d. per 'gas unit.' This can evidently be materially increased. The cost of oil, stores, and repairs on the gas plant was 0·069d. per unit, compared with 0·079d. for steam; and the net result for works cost was 0·338d. per gas unit, and 0·762 per steam unit, or for both plants combined 0·466d. per unit.

"In considering these figures, it must be borne in mind that the gas plant was comparatively small, and was only in full operation for nine months; that the steam and gas stations were practically independent, so that the wages were higher than they would otherwise have been; and that the steam plant was not run for economy, but for convenience. Making due allowance for these facts, we think Mr. Gray is to be congratulated on the large measure of success that he has attained in the past year; and there is every reason to anticipate that when he has the extended plant in full operation, with the experience he has gained, he will be able to show results still better than those recorded above."

Seville Water Company, Limited.—At the annual meeting of this Company last Friday, the Directors reported that the income for the past year had amounted to £44,016. After deducting working expenses, the cost of laying on services and the interest on debentures, the net profit for the year was £10,695, as compared with £11,062 in the preceding year. To this sum was added the unappropriated profit at March 31, 1913—£5616—making the amount to the credit of the profit and loss account £16,311. The Directors recommended a dividend of 3½ per cent., free of income-tax, which will absorb £9664—carrying forward £6647. The Chairman (Mr. Cowley Lambert), in moving the adoption of the report and accounts, stated that the scheme for the river supply had been sent up to Madrid; and the Directors had received unofficial intimation that the Government had approved the project. The scheme had taken sixteen months to pass the bodies before whom it had had to be laid. The new works would probably take some two years to carry out. The report was unanimously adopted.

SMETHWICK GAS UNDERTAKING.

Increase for the Engineer.

The Smethwick Gas Committee, in a report issued on Saturday, stated that they had considered an application for an increase of salary from the Engineer. It was over six years since the last advance was given, and during this time the output of gas had increased by 121 million cubic feet. Large extensions and additions to works and plant had been carried out by the Engineer, while still further important works (including a gasholder) had to be undertaken. In the past few years also substantial advantages had been granted to everyone employed at the gas-works, excepting the Engineer. In view of this, the Committee recommend that the salary of Mr. Vincent Hughes be increased, as from July 1, by £50 per annum—viz., from £500 to £550—and afterwards by £25 per annum in each of the two succeeding years, up to £600.

The Committee had carefully considered the question raised at the last meeting of the Council with reference to a suggested reduction in the price of gas to prepayment and small ordinary consumers; and having gone closely into the matter, and bearing in mind also the financial outlook of the undertaking in view of a further increased cost of coal, with the continued depression in the value of residual products, which will most seriously affect the results of the current year, they were unable to recommend any alteration in the price of gas.

GAS-WORKS EXTENSIONS AT BURTON.

An application by the Burton-on-Trent Corporation for sanction to borrow £25,000 for the purposes of their gas undertaking formed the subject of an inquiry last week by Mr. H. R. Hooper, on behalf of the Local Government Board.

It was explained by the Town Clerk (Mr. J. B. Chapman) that an Act of 1853 authorized the Corporation (then the Commissioners) to manufacture gas and to sell it at a sum not to exceed 7s. per 1000 cubic feet, which maximum was reduced by the Provisional Order of 1913 to 4s. 6d. The present price was the low one of 2s. to 1s. 10d. per 1000 cubic feet for ordinary purposes, apart from certain differential charges in respect of areas outside the borough. A Provisional Order enabled the Corporation to purchase the undertaking of the Barton-under-Needwood Gas Company, and extended the gas limits of the Corporation so as to include the township of Barton, the parish of Dunstall, and so much of the parish of Branstone as was not then within the existing gas limits of the Corporation. A further Provisional Order empowered the Corporation to purchase, by agreement, the Tutbury gas undertaking and the Rolleston gas undertaking, and extended the gas limits of the Corporation so as to include certain parts of those

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parishes and the townships of Hatton and Stretton. The present application was made under sections 36 and 68 of the Burton-on-Trent Improvement Act, 1878; and all the proposed works would be on land that the Council were authorized to use for the manufacture of gas. The steady increase in the output of gas from the Corporation works, and the rate at which the maximum daily output was approaching the capacity of the retort-houses, had the close attention of the Gas Committee last year; and after due consideration they put the case before the Town Council in December. A report was sent to each member, pointing out that the safe working capacity of the existing retort-houses was just over 2,000,000 cubic feet per day, and the maximum output the previous winter had been 1,824,000 cubic feet. The Committee, therefore, recommended the extension of the newer retort-house, erected in 1910, by four beds during the present year. These four beds would take up all the ground space available for retort-house plant; and in order to make room for further extensions the Committee recommended that the existing boiler-house, exhauster-house, pumps, water and liquor tanks, condensers, scrubbers, and washers be taken down and replaced by plant of greater capacity, to be erected on another part of the works—the particular parts of the plant still large enough for present requirements being re-erected instead of replaced. This proposal would clear the ground for the erection of six more beds of retorts, bringing the total safe working capacity of the retort-houses to nearly 3,250,000 cubic feet per day. The Council unanimously adopted the Committee's report, and an application was sent to the Board for sanction to borrow £20,000, the estimated cost of the whole of the work, of which the first part—viz., the erection of four additional beds of retorts—was estimated to cost £5000. Plans and specifications for this first part of the extension were prepared, and tenders were considered by the Committee in May. In view of the urgency of the case, the necessary contracts were entered into. The following remarks in the report sent to the Local Government Board in 1913 explained the necessity for carrying out the first part of the scheme before the ensuing autumn: "Bearing in mind the requirements of Rolleston and Tutbury, which will have to be met next winter, and the large number of gas-fires which are now being fixed, an extension to the retort-houses must be made before next autumn if the Committee are to be in a position to maintain a proper supply of gas during the depth of winter." Although in the original estimate of £5000 for the first part of the extension, 10 per cent. had been added to the prices paid in 1910, and 10 per cent. for contingencies, it was found that the total amount of the tenders was £6734. The increase was accounted for to some extent by the side walls of the retort-house being continued further than was at first intended, and by the substitution of segmental retorts for the moulded ones adopted in the first portion of the new retort-house. The Committee reported this increase to the Council, and on their recommendation a resolution was unanimously passed directing a revised application to be sent to the Local Government Board, asking for sanction to borrow £25,000, instead of the £20,000 originally asked for.

Information on various points was furnished by the Consulting Engineer (Mr. J. Ferguson Bell, of Derby); and in the course of discussion it transpired that the period asked for the larger part of the loan was thirty years. The Inspector inquired whether twenty years would not be sufficient; and the Town Clerk pointed out that the Board last year granted thirty years for extensions in connection with Tutbury and Rolleston.

The Inspector remarked that electricity was fast becoming a strong competitor; and, to an extent, the future of gas would be governed by the progress made by the former. In view of the fact that the total sum applied for was for work which would extend over several years, he did not see his way to recommend the granting of more than the £7000 required for immediate necessities—viz., the provision of the four beds of retorts. When it became necessary to complete the scheme—say, in about eighteen months or two years' time—the Council could forward an application for the balance of the loan. He did not know that a second inquiry would be necessary.

MANSFIELD GAS PROFITS.

A marked increase in the quantity of gas manufactured was reported at the last meeting of the Mansfield Town Council; Mr. T. SMITH (the Chairman of the Gas Committee), characterizing the results of the year's working as being thoroughly satisfactory, having regard to the present depressed state of the market for all residuals. Despite the latter drawback, there had, he said, been only a slight diminution in the gross profits, the chief point being the great increase in the quantity of gas made. The report gave the figures as 14,339,000 cubic feet. Owing to the extraordinary price of oil, the water-gas plant had for a time been out of operation. The sulphate plant had worked well, but prices were very low, and they were threatened with a sorry time, having regard to what was now taking place elsewhere in relation to the process of manufacture. In common with others running gas undertakings, the Corporation had to pay a lot more for coal last year; but they looked forward to obtaining a substantial reduction of rates in the ensuing twelve months.

Mr. J. MARRIOTT, in elucidation of the accounts, inquired whether the profit made by the sulphate plant was included in the net profits, of which part was applied in relief of the rates, the remainder going to the reserve fund. If it were so, it showed, according to his calculation, that the gas had only made £887 profit during the year. He thought it would be better if the Committee told them exactly what the sulphate plant had been making during the year. There was something wrong somewhere. They always got from the Gas Committee £1500 to £1800 in relief of the rates, before the sulphate plant was introduced. Yet, now the plant was making a net profit of £1141, they only obtained £1500 for the rates.

Mr. J. H. COLLINS said he had raised the question of the financial

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adjustment in Committee, pointing out that if the cost were properly apportioned the sulphate plant would show a smaller and the gas department a larger profit.

The TOWN CLERK remarked that in any circumstances the total profit would remain the same.

Mr. COLLINS replied that when he raised the point in Committee it was promised that the accounts should be so kept another year that the ammoniacal liquor would be charged to the proper account.

In replying on the discussion, the Chairman of the Committee pointed out that several reductions had been made locally in the price of gas, and he estimated that had it not been for the extraordinary increase in the cost of coal they would have been able to give £6000 in relief of the rates; but they were paying £3600 more for coal than they were three years ago. With regard to the question of accounts, arrangements were contemplated by the Committee which would show clearly the figures—the sulphate plant paying over to the gas department exactly the market price realized.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The estimated expenditure by the Lighting Department of the Edinburgh Town Council for the period from May 15, 1914, to May 15, 1915, is £43,375, as against last year's estimate of £44,525, and an actual expenditure in 1912-13 of £44,091. In this connection it is interesting to note that the Electric Lighting Committee have agreed to increase the stair lights from 5 to 11 candle power, at the same price as formerly, and to reduce the price of new stair lights to 15s. 6d., which is the amount charged by the Gas Commissioners for incandescent stair lighting. It speaks well for gas that the electrical suppliers have continually to reduce their prices to enable them to have any chance of competing with modern incandescent and high-pressure gas.

The Hawick Gaslight Company have held their meeting, with Provost Melrose presiding. There has been a rather substantial increase in the sale of gas, and, what is not so usual this year, there is an increase in the returns from residual products. Owing to the reduction in the cost of coal, the Directors intend keeping the price of gas as last year—namely, 2s. 3½d. per 1000 cubic feet. This year the profits are £1796, and the credit balance is £2493. A dividend of 5 per cent. was declared. During the meeting it was mentioned that one of the Directors, Mr. James Glenny, had held the position for 33 years.

At Dalkeith the ten years' agreement of the Town Council with the Electric Lighting Corporation expires shortly, and the Council are experimenting with different forms of illuminants before deciding upon their future policy.

The Kinross and Milnathort Gaslight Company have held an extraordinary meeting of the shareholders to consider certain resolutions in connection with a letter received by the Directors from the Town Clerk of Kinross, in which he intimated that the Town Council of the burgh had adopted the Burghs Gas Supply (Scotland) Act, 1876, and offered to purchase the whole undertaking of the Gas Company. Resolutions were unanimously passed consenting to sell the undertaking to the Town Council, and authorizing the Directors to appoint an arbiter on behalf of the Company, should they fail to agree with the Council as to the terms and the conditions of sale.

To anyone coming from a large city, the method adopted in most small towns of Scotland of either shutting down the public lamps entirely, or at least only lighting them during the part of the month when there is not the least possibility of the moon being seen, appears peculiar, especially in localities where people congregate during the summer months. At such times these places contain many more than the usual population, and it would appear wise to give the most light possible to those who are paying well for the privilege of being in that neighbourhood. It has been decided by the authorities of Pitlochry—a place much in vogue for summer visitors—to have the public lamps lighted throughout the season, so that the visitor may obtain the full benefits to which he is accustomed in his native city. This example might well be followed by other summer resorts which depend largely upon visitors for their upkeep during the remainder of the year.

The case brought by Mr. W. R. Herring against the Trustees of the late Mr. H. W. Hope, of Luffness, for the recovery of fees, &c., amounting to about £87, for professional services rendered in connection with the improvement of the gas supply of Luffness House, has now been concluded in the Sheriff Court at Haddington. The Sheriff held that certain work done in connection with the making of gas and improvements at the Aberlady Company's works did not come entirely within the instructions given to Mr. Herring. Mr. H. H. Gracie, who had done some of the work for Mr. Herring, and Mr. Henry O'Connor, who designed the extensions at the Aberlady Gas-Works, gave evidence in support of Mr. Herring's action. The Sheriff decided that Mr. Herring's charge of £10 10s. per day was not excessive, and gave him decree for £65, and awarded him full expenses. The decision is very satisfactory, in view of the fact that much professional work is done without a question of the fee to be charged being asked before the work is begun. If the employers are to withhold payment, and only offer a mere pittance for such professional work, calculated upon the basis of a 5 per cent. commission, when the bulk of the work is reporting and expert examination, it would be necessary for every professional man to state his fees beforehand, which would have to be large enough to cover all possible and probable outlays and time, and would thus be generally much more expensive to the employers.

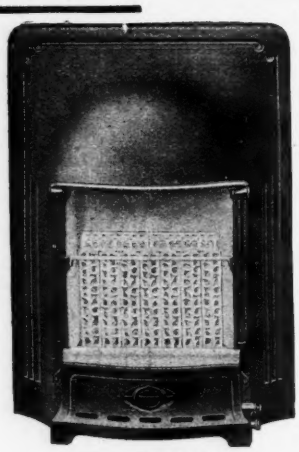
It has been recommended by the Gas Committee of the Dumfries Town Council that the price of gas should be reduced by 2d. per 1000 cubic feet, and a sum of £1000, out of the £2000 surplus on last year's working, placed to the reserve. The price of gas at present is about 2s. 8d. per 1000 cubic feet.

SUCCESS AGAIN

FOR

"CANNON" Gas Fires.

FIRST in 1906
FOR
RADIANT EFFICIENCY
SMOKE ABATEMENT TESTS
(See "THE LANCET," 17th Nov., 1906.)



FIRST in 1914
FOR
HYGIENIC EFFICIENCY
LANCET OFFICIAL TESTS
(See "THE LANCET," 4th April, 1914.)

THE BEST GAS FIRE FOR YOUR HIRE LIST.

THE "ROSE."

Send for List of Complete Range of Interchangeable Fires.

CANNON IRON FOUNDRIES, LIMITED,

DEEPFIELDS, near BILSTON, Staffs.

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Australasian Agents: MOLDEN & BUDDEN PTY., Ltd., 364A, Little Collins Street, MELBOURNE, Vic., and at SYDNEY, N.S.W.

The minutes of the Gas Committee of the Hamilton Town Council contain certain references to the annual report of the Manager, Mr. Ballantyne, on the working for last year. A debit is shown of £54 9s., even with the use of the balance of £1435 from the previous year. To liquidate the debt in the suspense account requires £500, and the same sum falls to be added to the reserve account as in the previous year. The estimates for the coming year show a probable profit (gross) of £4651, and this should be sufficient to meet the annual charges for interest, sinking fund, &c. These items amounted to £4620 last year, but they will be increased this year, owing to the amount being expended upon the new plant, by probably some £1400. The discussion on the report will come up later, but it is considered satisfactory in view of the high price of coal, the price of residuals, and the low charges made for the gas supplied; and the Provost said it spoke well for the administration of the Gas Department. In view of the remarks already made about the lighting of lamps during the summer evenings at Pitlochry, a discussion which took place at the Hamilton Town Council meeting shows that the smaller towns are not alone in this attempt to save money at the expense of the ratepayers' comfort. Complaint has been made by the railwaymen, and Councillor Macpherson characterized "the practice of putting the all-night lamps out in the summer season as a prehistoric idea for which no reason now exists." The matter is still under consideration; but as the lighting begins in two weeks' time, the decision cannot have much interest for nearly twelve months.

At Dunfermline the price of gas has not been changed either within the city or in the Limekilns and Culross districts. The North British Railway Company, through their Engineer, have written that they have agreed to instal high-pressure lighting in the engine shed at Dunfermline Upper Station, and the Gas Committee have agreed to supply high-pressure gas at 2s. 4d. per 1000 cubic feet, subject to the usual discount, and to clean and renew all glass and supply all mantles and small burner parts of the lamps at rates varying from 1s. 6d. to 3s. 9d. per burner per quarter. Mr. Waddell's salary is not to be immediately increased by £100, as recommended by the Gas Committee, but he is to have £50 increase now, and another £50 at the end of the year. The output of gas when he was appointed was 65,000,000 cubic feet, but it is now 177,000,000 cubic feet, and Mr. Waddell is engaged in trebling the capacity of the works. His salary when he went to Dunfermline was 1·18d. per 1000 cubic feet sold, but it is now only 0·75d.

The Eyemouth Gas Company have declared a dividend of 10 per cent., and reduced the price of gas from 5s. 10d. to 5s. per 1020 feet.

Among the joint-stock companies recently registered are the Cloudsley Engine Company, Limited, with a capital of £15,000, in £1 shares; and the Smokeless Fuel Syndicate, Limited, with a capital of £35,000, in £1 shares, of which 15,000 are 10 per cent. cumulative preference shares. The Syndicate will adopt agreements with "Fuel Limited," and Mr. J. Chapman, and carry on business in the United Kingdom, Europe, or elsewhere.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 27.

The demand for tar and pitch for road purposes continues unabated, and the attention of makers is fully occupied with deliveries. Pitch is firm, and the tendency of price is upward. The values of tar products remain generally the same as stated last week.

Sulphate of ammonia, although not a vigorous market, is quite steady, and a considerable business has been done at £10 15s. net for July-September, and at £11 net for the spring, for 25 per cent. quality, filled into buyers' bags at makers' works.

Manchester Tar Prices.

It is officially announced that the average price realized for June deliveries of tar in the Manchester district—based on the value of the products—was 29s. 1d. per ton.

Tar and Tar Products in the Provinces.

July 27.

The average values during the week were: Tar, 25s. to 29s. Pitch, east coast, 33s. 6d. to 34s.; west coast, Manchester, 32s. to 33s.; Liverpool, 33s. to 34s.; Clyde, 33s. to 34s. Benzol, 90 per cent., naked, North, 8½d. to 9d.; 50-90 per cent., naked, North, 10d. Toluol, naked, North, 10d. to 10½d. Crude naphtha, in bulk, North, 4½d. to 4¾d. Solvent naphtha, naked, North, 8½d. to 8¾d. f.o.b. Heavy naphtha, naked, North, 9d. to 9¼d. f.o.b. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, 3⅞d. to 4⅛d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 1d. to 1s. 1½d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1¾d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

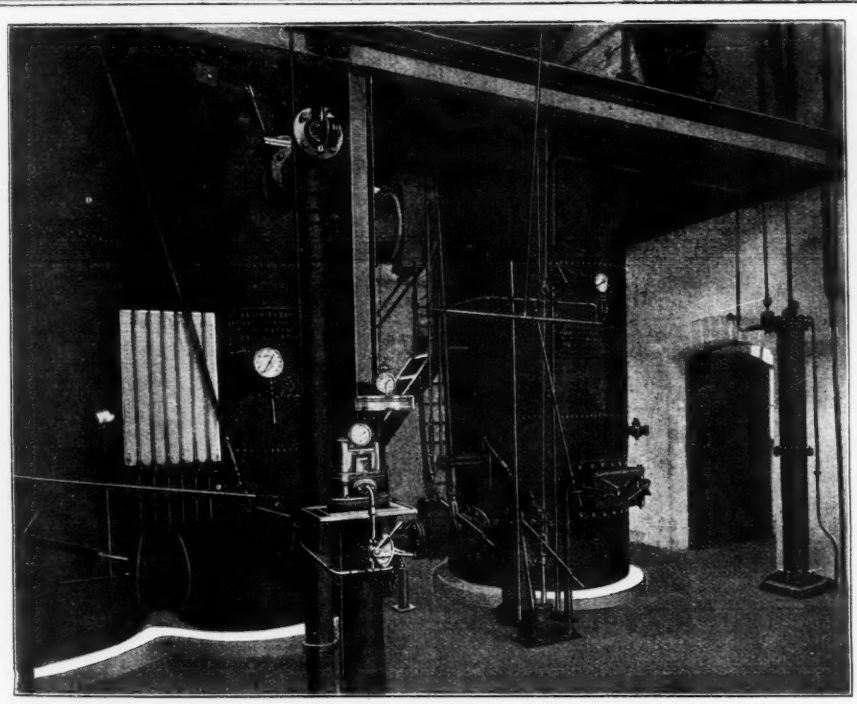
LIVERPOOL, *July* 25.

There has again been an improvement in the demand throughout the week, and all available supplies for near delivery have been keenly competed for at hardening prices. The closing quotations are £11 per ton f.o.b. Hull, £11 2s. 6d. f.o.b. Liverpool, and £11 5s. per ton f.o.b. Leith. For October-March and January-June delivery in equal monthly quantities producers are now asking £11 10s. per ton at the ports; but foreign buyers have so far refused to pay the equivalent of this price, and no first-hand business has been reported.

Nitrate of Soda.

The market for this continues quiet but steady at 9s. 10½d. per cwt. for ordinary, and 10s. 1½d. for refined quality, on spot.

From another source it is reported that the market for sulphate of



DEMPSTER'S BLUE AND CARBURETTED WATER-GAS PLANTS

for

EFFICIENT and ECONOMIC WORKING.

For Particulars apply to:

R. & J. DEMPSTER, Ltd.,

Tel. Address: "SCRUBBER, MANCHESTER."

Gas Plant Works, MANCHESTER.

ammonia has been very quiet during the past week, and in some quarters business is reported at lower prices. Outside London, makes are quoted at £10 10s.; Hull, £10 17s. 6d.; Liverpool, £11; Leith, £11 to £11 2s. 6d.; Middlesbrough, £10 17s. 6d. to £11.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is steady, and there is a strong demand; but the difficulty of shipment through the strike of marine engineers has continued. In the steam coal trade the demand is full, and prices are firm. Best Northumbrians are from 15s. 3d. to 15s. 6d. per ton f.o.b., second-class steams are about 12s., and steam smalls are from 8s. to 9s. The output is well maintained; but there is the interference with exports named. In the gas coal trade there is activity and more disposition to contract ahead. The current prices are: Best Durhams 13s. 3d. per ton, f.o.b., second-class gas coals about 11s. 9d. to 12s., and "Wear Specials" from 13s. 6d. to 13s. 9d. There has been a contract settled for about 40,000 tons of second-class Durham gas coal for delivery over next year at 11s. 3d. per ton f.o.b. Other contracts are in course of negotiation; and as the lengthening of the nights will soon begin to stiffen prices, it is probable more business will be shortly reported. Some continental contracts, taken by foreign merchants, will, it is expected, soon be put into the market. There are rumours as to the placing of a large part of the Berlin gas-coal contracts for Durham coal. Coke is steady, and gas coke is in fair demand. Prices for the latter vary, according to quality, from 12s. 3d. to 13s. 3d. per ton f.o.b. in the Tyne.

The Year's Working at Morecambe.—The annual figures of the Morecambe Corporation Gas Department show that the gross profit on the past year's working has been £10,710. The net profit, after paying interest, sinking fund, &c., charges, was £1334, as compared with £2011 last year. The decrease is accounted for by the higher cost of coal. It was decided to allocate £437 for new meters and cookers, leaving an available balance of £907. The make of gas was 3½ million cubic feet more than the previous year.

Price of Gas at St. Ives.—The St. Ives (Cornwall) Town Council have agreed, on the recommendation of the Gas Committee, that an extra discount of 2½ per cent. be given to consumers of 20,000 up to 40,000 cubic feet per quarter, 5 per cent. to consumers of between 40,000 and 60,000 cubic feet, and 7½ per cent. to consumers of 60,000 cubic feet or more per quarter. The question of a further reduction to users of slot-meters and others was referred back for consideration. The price was recently reduced to 4s. 9d. per 1000 cubic feet to private consumers, and to 3s. 9d. for cookers and engines.

Staveley Gas Extensions.—At an extraordinary meeting, the Directors of the Staveley Gas Company recommended the raising of additional capital for the extension of the works, and also for the purpose of supplying gas to Barlborough. After discussion, it was resolved that an additional £2000 should be raised in £10 shares, to be offered by auction. It was also resolved that the Board be authorized to secure a Provisional Order for the parish of Barlborough.

Extensions at Huddersfield.—The Huddersfield Corporation Gas Committee have considered the question of extending the carbonizing plant at the gas-works, and have instructed the Engineer (Mr. E. A. Harman) to obtain tenders for a plant capable of manufacturing 2 million cubic feet of gas per day. In connection with the supply of gas to the Crosland Moor district, the Committee have given instructions for the laying of a new 18-inch main, at a cost of £1700.

New Pumping Plant at Stourbridge.—A new pumping engine and other works which have been carried out by the Stourbridge and District Water Board were formally inaugurated last Tuesday, when the members of the Board and representatives of the constituent authorities were entertained at luncheon by Mr. W. R. Selleck (the Chairman), Mr. W. Fiddian (the Consulting Engineer), and Mr. J. D. Harward (the Clerk). The new machinery provided is capable of lifting 1½ million gallons of water per day; and, in addition, the undertaking generally has been re-organized.

Colne Valley Water Company.—The profit of the Company in respect of the revenue account for the half year ended June 30 amounts to £17,632. The balance of the dividend and interest account, after paying the interest on the debenture and preference stocks, and transferring £1000 to the contingency fund, is £24,369. Out of this balance the Directors recommend the payment of the full statutory dividends at the rates of 10 and 7 per cent. per annum on the several classes of ordinary stock, and in addition a payment of 1 per cent. (actual) on account of back-dividends on the "A," "B," and "C" stocks, leaving £9989 to be carried forward.

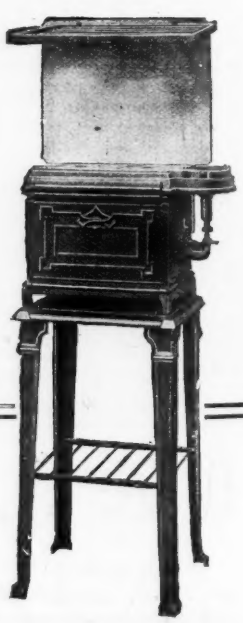
Improved Public Lighting at Nottingham.—Much gratification is being expressed in Nottingham at the indications which are forthcoming of the further enterprise of the city authorities in the matter of street lighting. In the past there has been somewhat of the *laisser-faire* policy; but with augmented financial resources the responsible Committee now find themselves able to effect improvements which have been too long delayed. The installation of high-pressure lamps in the main thoroughfare leading from the Midland Station having proved a marked success, this part of the installation is to be extended. Already in various central districts of the city over 1000 upright incandescent public lamps have been changed to inverted, and in this branch of the work there is an intention to effect, within the next few months, further needed changes. Except for a few electric lamps in the Market Place, which are not a great success, Nottingham depends entirely upon gas for its street illumination.

PARKINSON'S
OVEN-GRILLER

Very Serviceable in Cases
Where Space is Limited.

When the oven is in use, the browning shelf should be placed at the top of the oven, just under the grill, the waste heat making the hot-plate useful for warming plates or water, the side boiling burner being available at the same time.

SUPPLIED WITH OR WITHOUT BACK PLATE OR STAND.



THE PARKINSON STOVE CO., LTD.,
BIRMINGHAM AND LONDON.

Sedgley Gas-Workers' Wages.—The Sedgley District Council have decided to adopt the following revised list of wages for the stokers and labourers at the gas-works: Machine men to be increased to 5s. per shift (35s. per week, or 2s. 6d. per week increase); stokers to be increased to 4s. 6d. per shift (31s. 6d. per week, or 2s. 6d. per week increase); labourers to receive 23s. per week, increased from 21s.

Fusing Electric Wires.—An electric wire fusing under a wooden staircase is stated as the cause of a disastrous fire which last week completely destroyed a newly-opened cinema house at Perth. Various other buildings were more or less seriously involved in the catastrophe; the total damage done being estimated at about £8000. In fact, to electricity is thus ascribed "the most serious fire that has occurred in Perth for many years."

Oldham Coke for Oldham Electricity Works.—At the last meeting of the Oldham Electricity Committee, Alderman Wilde, J.P., the Mayor, and Chairman of the Gas Committee, suggested that, as the Committee were considering the letting of coal contracts, they should take into consideration the question of using the coke of the Gas Department. During the coal strike, it was proved that coke could be used. Mr. Ogden, the Station Engineer, replied that the coke "would pay at a price," but "at the prices charged it would not." Alderman Wilde said in that case the matter ought to be one for settlement between the two Committees concerned. The Gas Committee could guarantee certain delivery all the year round. The proceedings ended with a statement by Alderman Wilde that the whole matter would be at once gone into by the officials of the departments.

Montreal Light, Heat, and Power Company.—According to the report submitted at the last annual meeting of this Company, the gross revenue for the year ended the 30th of April was $6,245,697, and the net revenue $2,867,245. Deducting from the latter sum the fixed charges, the net income was $2,399,269. After payment of dividends, the surplus from the year's operations was $699,269, out of which $10,000 has been placed to the officers' and employees' pension fund, and the remainder transferred to the general surplus. Reductions have been made in the charges for gas and electricity; so that in future the price of the former will be 85 c. net per 1000 cubic feet, and the standard rate for electric incandescent lighting (overhead service) 6 c. net per kilowatt-hour.

Gas at an Agricultural Show.—In connection with the annual show of the Highland and Agricultural Society of Scotland, which has just been held at Hawick, it is interesting to note that gas was extensively utilized in the show-yard for the purpose of driving engine exhibits and supplying the various caterers. All the cooking was done by gas. This necessitated the introduction of a large supply to the show-yard; and the work was very efficiently carried out by Hawick Gas Company. In view of the large demand for gas, and to ensure efficiency, the Company installed high-pressure plant, which took the form of an exhibit at their stand in the ground; the compressor being driven by a 4 H.P. gas-engine. By means of this compressor, the gas was distributed to the various users at a pressure of 2 lbs. per square inch. Many visitors interested in the use of high-pressure gas visited the Company's stand, and were much impressed by the display.

GAS COMPANIES IN THE STOCK EXCHANGE.

History moved with rapid strides last week. Rarely within the short compass of six days can more epoch-making events have been compressed. First came a Conference which was to decide whether England should be plunged in civil war, with its abortive failure, which left us in blank darkness as to what may be the outcome. Even this tremendous danger was capped by the larger, and perhaps illimitable, peril of a European war, which at the close of the week appeared imminent, and inevitable save by a miracle. How the Stock Exchange suffered is now notorious, and last Saturday will not soon be forgotten. But even the gloom here was more than paralleled by Continental Bourses, which were reported in a state of panic. Tracing the course of movements in the chief markets: Monday opened bravely, clinging to the Ulster Conference as to a lifebuoy. Consols rose to 76⅛; but, before other markets could sympathize, adverse influences set in from the Continent. The Foreign Market was depressed, and Rails were weak from sheer inaction. Tuesday was a gloomy day, home and foreign politics and gold movements being the dark clouds. Consols fell ¼, Rails were lower, and heavy Continental selling depressed Transatlantics among others. Wednesday opened in a state of semi-paralysis. With deep misgivings as to the Conference, and alarmed by the Near East, none knew how to lay. Eventually the disposition became calmer. Consols only lost ⅛, and the Foreign Market was less agitated. Wall Street was a buyer; but Rails were quite flat. Thursday was much depressed; the prolonged tension of the Ulster crisis producing something like desperation. All the Government issues were flat, and Consols fell ¼. Berlin was selling wildly, and helped to drag everything down. On Friday the depression was profound. All hopes of the Conference were abandoned, and the darkest forebodings regarding the Austro-Servian embroglio being entertained, while the selling on the Continent was worse than ever. Even good dividend announcements could not keep Rails up. Consols fell to 74⅝. Saturday beggars description. It is declared to have been one of the worst ever known. Consols fell 1¼, closing at 73⅛ to 74—a loss of 1⅞ in the week. The Money Market steadily hardened and closed agitated. Business in the Gas Market meanwhile preserved its unruffled calm, and showed no disposition to take cognizance of external affairs. In point of activity it was a moderate average, and produced very little movement. In Gas Light and Coke issues, the ordinary was rather less active, and prices ranged from 103¾ to 104¾ (as in the week before); but the quotation was lowered ½. In the secured issues, the maximum marked 77½ and 79, and the preference 99. South Metropolitan was very quiet and unchanged; all dealings being between 112 and 113. The debenture made 74. In Commercials there was one bargain in the 4 per cent. at 106¾. Among the Suburban and Provincial group, Bournemouth "B" realized 15⅛ and 15½, British 44½, ditto debenture 91¾, Brighton original 211 to 212½, ditto "A" 156¾ and 157, Portsea "B" 130, Wandsworth "C" 114, and (on the local Exchange) Liverpool "B" 147. In the Continental companies Imperial made 165 to 167, ditto debenture 84½, and Union 78—a fall of 2. Among the undertakings of the remoter world, Oriental changed hands at 117, Primitiva at 5⅛, and ditto preference at 4 3/32 and 5.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, 4½ per cent. Consols, 73½—74. Previous week, 75½—75¾.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59—64	..	3 18 2	75,000	5	June 11	6	Malta & Mediterranean	4⅛—4⅜	..	6 9 9
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79*	..	5 1 3	250,000	100	April 1	4½	Met. of Melbourne 4½ p.c. Deb.	99—101	..	4 9 1
280,000	5	April 29	7½	Bombay, Ltd.	5⅞—6⅜	..	5 17 8								
50,000	10	Feb. 26	16	Bourne-mouth Gas & Water 10 p.c. B 7 p.c. Pref. 6 p.c.	29—30	..	5 6 8	541,920	20	May 28	4	Monte Video, Ltd.	11⅝—12⅛	..	6 13 1
852,500	10		7		15—15½	..	4 10 4	1,775,892	Stk.	Feb. 26	4½	Newc'tle&G'tesh'd Con.	100½—101½	..	4 9 1
75,000	10	,,	6		13½—14	..	4 5 9	529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82—83	..	4 4 10
880,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	+1	5 5 3	55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—15	..	5 2 8
880,000	,,	,,	11	Do. New	204—209	..	5 5 3	300,000	Stk.	May 14	8	Oriental, Ltd.	117—122	..	6 11 2
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	..	4 10 1	60,000	5	Mar. 26	10	Ottoman, Ltd.	7½—7⅝	..	6 9 0
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	..	4 6 0	60,000	50	Feb. 26	13	Portsea, Island B	128—131	..	4 19 8
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	..	5 3 4	100,000	50	,,	12	Do. C	118—121	..	4 19 2
244,200	,,	,,	8	Do. A Ord. Stk.	154—159	..	5 0 8	249,980	5	April 29	8	Primitiva Ord.	5⅜—6⅛	..	6 8 0
530,000	20	Mar. 26	12½	British	44—45	..	5 11 1	499,960	5	June 26	5	,, 5 p.c. Pref.	4⅞—5⅛	..	4 17 7
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	..	4 8 11	521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	..	4 6 0
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85—87	..	4 12 0	346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	..	4 12 0
100,000	10	—	—	Cape Town & Dis., Ltd.	1⅞—2⅛	..	—	150,000	10	May 14	6	San Paulo 6 p.c. Pref.	10⅛—11	..	5 9 1
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	..	—	125,000	50	July 1	5	5 p.c. Deb.	47—49	..	5 2 0
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	..	6 0 0	135,000	Stk.	Mar. 12	10	Sheffield A	223—224	..	4 9 3
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	108—110	..	4 10 11	209,984	,,	,,	10	Do. B	222—224	..	4 9 3
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	..	5 1 2	525,500	,,	,,	10	Do. C	220—222	..	4 10 1
560,000	,,	,,	5⅛	Do. 3½ p.c. do.	103—105	..	5 1 6	90,000	10	May 28	9	South African	10½—11½	..	7 16 6
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½—71½	..	4 3 11	6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111—113	..	4 16 8
800,000	Stk.	,,	4	Continental Union, Ltd.	76—79	−2	5 1 3	1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½—74½*	..	4 0 6
200,000	,,	,,	7	Do. 7 p.c. Pref.	115—118	..	5 18 8	209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	..	5 6 11
492,270	Stk.	—	6	Derby Con. Stk.	123—125	..	4 16 0	952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	..	5 3 5
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11	60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	..	4 9 3
1,002,180	10	Jan. 15	10	European, Ltd.	18⅜—18⅝	..	5 7 5	117,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	..	4 4 9
16,386,660	Stk.	Feb. 12	4/17/4	Gas 4 p.c. Ord.	102½—104½	−½	4 13 2	629,740	Stk.	May 14	5	Southampton Ord.	99—102	..	4 18 0
2,600,000	,,	,,	3½	Light and Coke 3½ p.c. max. 4 p.c. Con. Pref.	76—79	..	4 8 7	120,000	Stk.	Feb. 12	7½†	Tottenham District A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	..	5 8 8
4,062,235	,,	,,	4		96—99	..	4 0 10	543,940	,,	,,	6†		115—117	..	5 2 7
4,674,850	,,	June 11	3	3 p.c. Con. Deb.	72½—74½	..	4 0 6	149,470	,,	June 26	4		87—89	..	4 9 11
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	..	5 12 4	182,380	10	Dec. 30	5	Tuscan, Ltd.	5—6	..	8 6 8
70,000	10	April 29	11	Hongkong & China, Ltd.	16½—16⅝	..	6 11 4	149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	..	5 5 3
131,000	Stk.	Mar. 12	7⅝	Ilford A and C	151—154	..	4 19 0	236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	..	4 11 4
65,780	,,	,,	6⅛	Do. B	115—118	..	5 3 10					Wandsworth, Wimbledon, and Epsom—			
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	..	4 5 1								
4,940,000	Stk.	May 14	9	Imperial Continental	163—168	..	5 7 2	80,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151—156	..	5 7 4
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84—86	..	4 1 5	255,636	,,	,,	6⅞	,, B 3½ p.c.	129—134	..	5 2 7
200,242	Stk.	Mar. 12	6⅓	Lea Bridge Ord. 5 p.c.	119—121	..	5 7 5	108,075	,,	,,	5/17/3	,, C 3½ p.c.	110—115	..	5 2 0
561,000	Stk.	Feb. 26	10	Liverpool United A	211—213	..	4 13 11	352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	..	5 0 5
718,100	,,	,,	7	Do. B	146—148	..	4 14 7	98,000	,,	,,	6⅝	Epsom 5 p.c.	121—126	..	5 5 2
306,083	,,	June 26	4	Do. Deb. Stk.	97—99	..	4 0 10	88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	..	4 6 11

Prices marked * are "Ex Div." † Next Dividend will be at this rate.

Lincoln Gas and Water Undertakings.—Some interesting figures indicative of the profitable nature of the Lincoln Corporation gas and water undertakings are embodied in the report of the Auditors just completed for the year ended March last. The water revenue account discloses a total income of £30,684; there remaining, after deducting expenditure, an available balance of £20,510. The assets are represented by the sum of £117,293. The total quantity of gas sold during the year was nearly 374 million cubic feet; the total income being £55,383. The expenditure, including £31,527, cost of manufacture, was £39,814, and the gross profit £15,568. The aggregate municipal balance-sheet, embracing also the electricity and tramway concerns, shows a balance of £623,035 over liabilities.

Bradford Water-Works Inspection.—A large number of aldermen and councillors attended the annual official visit last Tuesday to Angram to witness the progress made there with the Bradford water supply extension scheme. The Lord Mayor (Alderman John Arnold) was present; and a feature of the day's proceedings was the laying by him of a stone on the last arch of a bridge. The party were under the guidance of the Water Engineer (Mr. James Watson), the Chairman of the Water Committee (Alderman A. Gadie), and the Deputy-Chairman (Alderman J. E. Fawcett). Mr. Best (the Contractor) was also present. General satisfaction was expressed with the progress made; and at a luncheon which followed the inspection, Alderman Gadie said he wished to give credit to Mr. Watson for having in his new scheme, under which there would be two reservoirs instead of three, saved no less a sum than £250,000 for the ratepayers.

Blackburn Gas Strike Figures Criticized.—Mr. James Frankland, J.P., one of the Elective Auditors for Blackburn, addressing a meeting on the Market Ground last week, alluded to the recent strike of gas-workers and labourers. He said that, despite Blackburn's reputation as the strongest trades union town in the world, the Corporation decided to go to the National Free Labour Association to get men to break the strike. In comparison with the humble rates of pay which the men themselves were demanding, the payments made to the strike-breakers were enormous. One man was paid, for twenty-two days, at the rate of 17s. 6d. per day, and another received 40s. 1d. a day; while a professional man was given 3½ guineas per day. In addition to feeding, clothing, and housing the strike-breakers, the Corporation provided them with a doctor. Ordinary "twist" was not good enough for them, for there was an account for Egyptian cigarettes, along with 20,000 bottles of mineral water and a quantity of Pilsener.

Ashton-under-Lyne and District Water Supply.—After seven years' work, the new reservoir in Chew Valley has been completed for the Ashton District Joint Water Committee. It is over 1600 feet above sea level, and is claimed to be the highest reservoir in the kingdom. The holding capacity is 206 million gallons, and £146,000 has been expended on its construction. This brings the capital value of the Committee's undertaking (which supplies water over an area of 52 square miles) to almost a million pounds sterling. The works include about 6 miles of pipe-lines, 1¾ miles of aqueduct, a tunnel three-eighths of a mile long, and five weirs.

The Local Government Board have, we learn, in several cases—among them Itchen, near Southampton, and Litherland, near Liverpool—given their sanction to local authorities for loans for the purpose of installing "Gunfire" controllers.

The Gas Committee of the Bradford Corporation have decided to join the newly-formed Association of Sulphate of Ammonia Manufacturers, on condition that the Committee retain the right to sell through their own agents as heretofore, instead of through the Association.

A man was killed in Cardiff last Thursday, while engaged in repairing the underground electric cables. He was changing a transformer; but it is not definitely known how he came to touch a live wire. Four other men were working with deceased at the time; and he was seen to suddenly fall backwards without uttering a word.

The fourth annual exhibition of flowers, fruits, and vegetables, organized by the employees of the South Metropolitan Gas Company, was held in the sports ground at Old Kent Road last Saturday week, and was a great success. There were nearly a hundred more entries than last year. Mr. Charles Carpenter, D.Sc., performed the opening ceremony; and Mr. W. Doig Gibb presided. In the evening the prizes were distributed by Mrs. Doig Gibb, to whom a bouquet was presented by Miss Marjory Hunter.

Press reports state that Miss Georgina Howard, of Finchley, was stepping off a tramway car there last Saturday week, when she was knocked down by a motor car and fatally injured. A singular occurrence followed the accident. After striking the lady, the motor car mounted the pavement and demolished an electric section box, the wires of which became mixed in such a way that all the metal part of the car became "alive," and it was threatened with destruction by fire. The task of removing the vehicle was too dangerous to be attempted until the current was shut off some time afterwards.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ASSISTANT WATER ENGINEER. City of Birmingham. Applications by Aug. 31.
GAS INSPECTOR. Wellington (N.Z.) Gas Department. Applications to Messrs. John Terry and Co., 7, Great Winchester Street, London, E.C.
INSPECTOR-CANVASSER. No. 5920.
CLERK OF WORKS. Farnham Gas-Works.
METER REPAIRER. Sheffield Water Department.
STOKER. Hawkhurst Gas Company.
REPRESENTATIVE (Gas Apparatus). No. 5921.
GAS FITTERS. No. 5911.

Plant, &c. (Second Hand), For Sale.

PIPES AND GOVERNOR, &c. Cannock, &c., Gas Company.
EXHAUSTER AND MANNESMANN STEEL SPRINGS. Glastonbury Gas-Works.
HYDRAULIC MAIN, DIP PIPES, &c. Bideford Gas Company.
EXHAUSTER. Newcastle-on-Tyne Gas Company.
STEAM AND PUMPING ENGINES AND ACCUMULATOR. Salford Gas Department.
BRIDGE AND DIP PIPES AND HYDRAULIC MAINS. Manchester Gas Department. Tenders by Aug. 6.

Gas-Works for Disposal. No. 5916.

Gas-Works Wanted.

"D. G.," c/o Scripps's Advertising Offices.

Meetings.

BRENTFORD GAS COMPANY. St. Ermin's Hotel, Aug. 7. 2.30 o'clock.
GAS LIGHT AND COKE COMPANY. Horseferry Road, Aug. 7. Twelve o'clock.
HORNSEY GAS COMPANY. 5, Great Winchester Street, E.C. Aug. 14. 3.30 o'clock.
SOUTH SUBURBAN GAS COMPANY. De Keyser's Hotel. Aug. 14. Three o'clock.

TENDERS FOR

Castings, Retort Fittings, &c.

NOTTINGHAM GAS DEPARTMENT. Tenders by Aug. 5.

Coal.

COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by Aug. 1.
DEVONPORT GAS DEPARTMENT. Tenders by Aug. 12.
HEREFORD GAS DEPARTMENT. Tenders by July 25.
HEYWOOD GAS DEPARTMENT. Tenders by Aug. 11.
OLDHAM GAS DEPARTMENT. Tenders by Aug. 11.
RAMSEY GAS COMPANY. Tenders by Aug. 1.
SHEFFIELD GAS COMPANY. Tenders by Aug. 6.
WORKSOP GAS COMPANY. Tenders by Aug. 5.

General Stores (Acid, Tinned Ware, &c.).

HEYWOOD GAS DEPARTMENT. Tenders by Aug. 11.

Lamps, &c.

CALCUTTA CORPORATION. Tenders by Aug. 31.

Pipes, &c.

HEYWOOD GAS DEPARTMENT. Tenders by Aug. 11.
NOTTINGHAM GAS DEPARTMENT. Tenders by Aug 5.

Reservoir, &c.

BIRMINGHAM WATER DEPARTMENT. Tenders by Sept. 18.

Tar and Liquor.

WANDSWORTH, &c., GAS COMPANY. Tenders by July 30

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